NEW ZEALAND
JOURNAL OF
Agriculture
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# Cooper News

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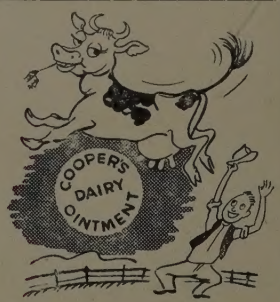


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# NEW ZEALAND JOURNAL OF Agriculture

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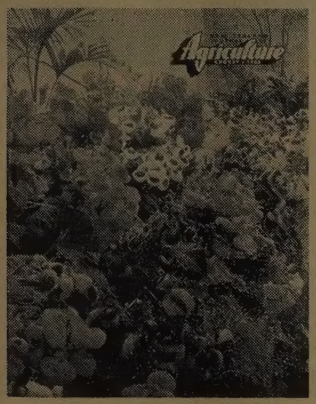
## *This Month's Cover*



*A very fine display of giant calceolarias in the Winter Gardens at the Auckland Domain forms the subject of this month's cover, which has been reproduced from a colour photograph by D. R. Brenchley. These large calceolarias, which are natives of Chile, develop during winter and flower toward the end of winter or in spring. For that reason they are difficult to grow outside, though the better-known, smaller type grows well and flowers profusely in the open when grown under favourable conditions.*

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3 OCT 1956

# RUAKURA FARMERS' CONFERENCE and FIELD DAY

▲ This procession to see the work of Dr. McMeekan's team showed similar enthusiasm in the mud and rain to that of a few days before to see Dr. Craven's team perform.

By G. J. NEALE

**THE tumult and the shouting that accompanied the South African Rugby team's opening match of its New Zealand tour against the Waikato team on 9 June had not died when the annual Ruakura Farmers' Conference Week opened a few days later at Hamilton. The impression the South Africans seemed to gain that "Rugby madness" excluded all other thoughts from Waikato minds would have been dispelled had they remained for the conference and seen the large crowds intent on their business of farming who toured the Ruakura Animal Research Station during the field day in heavy rain and mud.**

THE system the Station has been perfecting in recent years of having a fleet of buses tour a number of demonstration points where research projects and findings are discussed by the research staff concerned stood up well to difficulties of the weather that might have disorganised a less enthusiastic staff unprepared for the crowds that annually flock to Ruakura for the field day. Buses stopping at all points on the circuit of displays enabled visitors to stop off wherever they were interested and resume their tour whenever they wished. Shelter during bus transport and lunch at convenient points made conditions perhaps a little more pleasant for visitors than for the staff, who in weatherproofs and under umbrellas throughout the day addressed ever-changing audiences in generally unpleasant conditions and in bursts of heavy rain.

## Need for New Conference Hall

Papers for sheep farmers, which are presented on the first day of the conference, have been thought likely to draw smaller attendances than those on dairying, but increasing interest in sheep farming in the district and the large number of farmers coming to the conference from other districts in which sheep are the major interest have resulted in accommodation for the first day of the conference at the Staff Centre at Ruakura becoming heavily taxed. Two years ago a move to collect subscriptions toward a fund for the building of a conference hall at Ruakura was started, and though the over-all response from farmers was generally disappointing, enough was received to proceed with plans for building. Generous assistance was received from the Government, producer boards, and industry organisations.

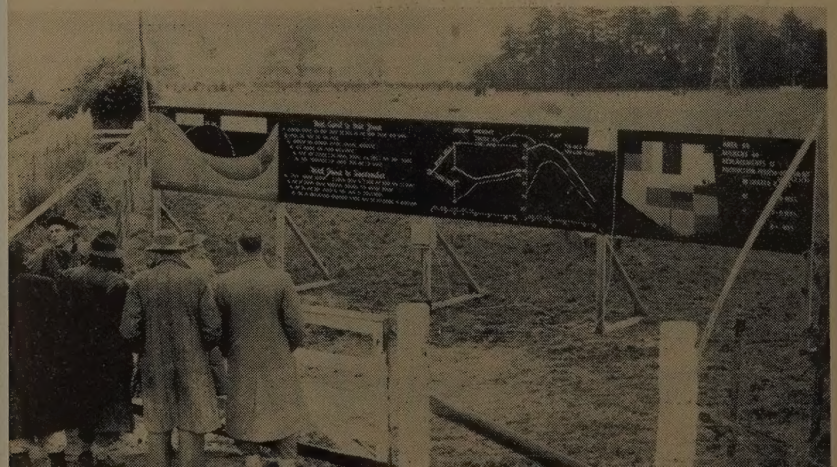
The last £300 required was received at this year's conference after Sir Bruce Levy, who opened the conference, appealed for financial support for the project. Sir Bruce's and other hats passed round the first-day attendance were returned well filled with donations.

Plans and specifications for the hall have been completed and a site selected near the new administration and laboratory block being built at the Station.

The hope that this would be the last year that visitors to Ruakura for the Farmers' Conference Week would have to put up with inadequate accommodation for conference sessions was expressed by the Superintendent, Dr. C. P. McMeekan. Because of the large attendances this year, evening sessions had to be shifted from the Station Staff Centre to a neighbouring hall. As in previous years a Hamilton theatre was used for the sessions for dairy farmers and for all farmers on the last two days of the conference.

## "Mooloo" Greeting to Sir Bruce Levy

In asking Sir Bruce Levy to open the conference Dr. McMeekan called for a "Mooloo type of applause" to welcome Sir Bruce to the first farmers' conference he had attended in the Waikato since his knighthood had been conferred, a recognition which was an honour to Sir Bruce personally, to science, and to the ordinary working farmer. Sir Bruce would face an



← Dr. L. R. Wallace's demonstration of Ruakura principles of winter management of the dairy herd to fit feed availability to production requirements.

audience as critical as any in the world, an audience of New Zealand farmers.

"Perhaps no farm week anywhere else in the world," Sir Bruce said in opening his address, "would give you more meat than Ruakura, where practice and research are so intimately linked and so 'commonsensely' directed and applied.

"I presume the reason for your presence here is that you may keep abreast of new knowledge, new ideas, and new inspirations in order that the great primary industry you represent may be brought to an even higher state of efficiency.

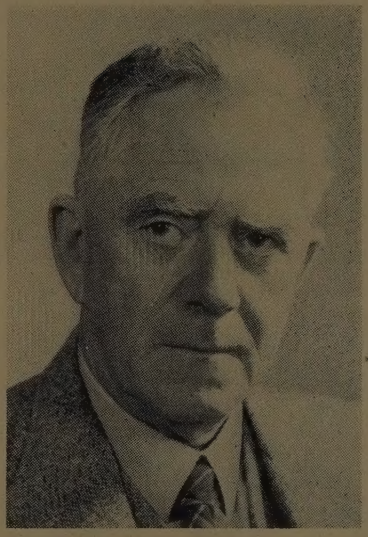
## More Volume of Production Needed

"Agricultural statistics over the past few years show a distinct upward trend in production. May this trend continue, and increase in momentum, for unless our volume of production more than keeps pace with our increase in population, then our national standard of life will deteriorate. Deterioration over the past 10 years has been staved off not by a rising production, but by ever-increasing prices for our agricultural products. It would be moonlight madness to imagine that rising prices on a similar pattern will continue to stave off economic deterioration over the next 10 to 20 years. Since 1938-39 we have the amazing spectacle of a volume of production increase of 33 per cent. and a value increase of 291 per cent., a relative volume to value increase of 1 : 9; or, in other words, the volume has increased by ⅓ and the value by 3 times.

"New Zealand's population is increasing fairly rapidly and the disconcerting facts to me are that, whereas in other parts of the world areas of high population density enjoying a relatively high standard of life must live by export, there is little effort being made in New Zealand to add to our export income by the export of manufactured goods.

"In 1954 the total value of export merchandise was £244,432,000, and of this practically the lot came from the land or out of the land. Not that farmers earned all that themselves, with so many ancillary interests working for primary production, but it is necessary to point out that increasing population without a corresponding bid by so-called secondary industries in New Zealand for overseas markets for their products must end in disaster.

"True, factories can claim today a high value turnover with some £495,377,000 output, but this includes farm produce to the value of £220,183,000, to which is added only approximately £24,000,000 in value in passage through the factories—dairy factories, meat works, tanneries, etc. The total added value by factories in New Zealand in 1954 was £162,519,000. The total farming income for 1954 was £309,100,000, some 70 per cent. of which was exported and some 30 per cent.



Sir Bruce Levy: Opening address and a hatful of contributions for the new conference hall.

used in local consumption. It is only a matter of simple arithmetic to show the position: 2,000,000 people use 30 per cent. of our exportable goods: 4,000,000 people would use 60 per cent.; 6,000,000 people would use 90 per cent., and when we reach 8,000,000 we will have to import food and clothing. . . ."

### "Proceedings" of the Conference

Printed "Proceedings" of the conference, containing all papers and discussion, will be sent to those who paid enrolment fees and to anybody prevented from attending who sends in an order (10s. per copy) promptly to the Ruakura Animal Research Station, P.B., Hamilton, or to the Department of Agriculture, Box 2298, Wellington.

Sir Bruce said he thought that ancillary interests, factories, and manufacturers in New Zealand should increase their efforts toward servicing agriculture and aim in the future to contribute materially to the export trade of New Zealand by manufactured goods.

An additional disconcerting fact was that land development and agricultural expansion seemed to share alike with other undertakings in the general credit squeeze induced largely by over-zealous importers and traders over-spending on decontrolled imports largely unrelated to servicing agriculture; 1954 imports were £213,275,000, of which £144,000,000 were decontrolled.

"It is easy," continued Sir Bruce, "to ease up on farm production; it is not so easy to get going again, and in the meantime confidence is lost to the industry. It does seem unreasonable to me to stultify our export income at its very source, rather than to encourage the expansion of this to give an ever-increasing amount of overseas funds for the necessary imports to the community without undue straining of those overseas funds.

## Doubling Agricultural Production

"It may seem somewhat of an imposition to suggest that farmers should work harder to provide more overseas funds for someone else to spend, but until some of the deficiencies I have mentioned are remedied, I am afraid farmers will have to shoulder the responsibilities of a greater increase in agricultural products for export. I think this increase is still possible. I still stick to my former estimate of some years ago that we could double our present agricultural production."

**The methods suggested by Sir Bruce were: Firstly, on the ploughable lowlands, by adopting, not here and there, but all over the country, a really intensive system of grassland farming. Secondly, on the hills, by speeding up the development of aerial topdressing, oversowing with clovers, and by clearing the secondary growths from the hills. "These," he said, "are the next two eras of grassland expansion. And what a vision; there would not be a grassland vista like it anywhere else in the world!**

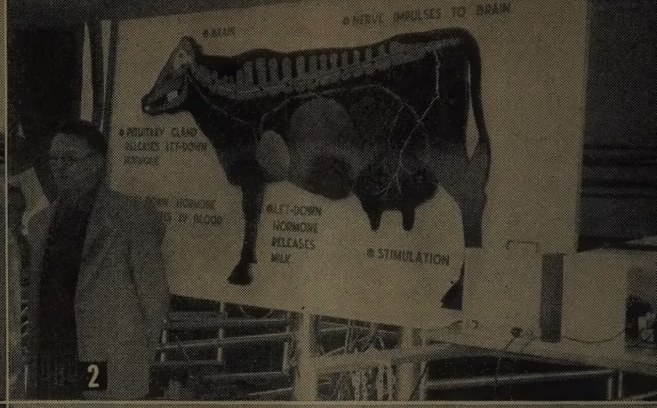
"In both jobs we should fully grasp the fundamental fact that land development—and there is still a lot of land development to be done—and pasture improvement rest on our ability to **make** the country carry a high stock density per acre. One and a half sheep per acre, even plus cattle, will never improve country; it would be perpetually going back into scrub and at best would carry a dominant danthonia sward. Three to four ewes, plus cattle, will still leave the land languishing in soil fertility. It is only when we reach the 6 to 8 ewes per acre or more, plus some cattle, or round about 1 dairy cow per acre, that we know there is a shower of fertility returning to the land to provide the plant foods for the next crop of grass. Our three great allies in attaining this high production are our splendid grassland climate; good clovers and phosphates; or phosphate, lime, potash, and molybdenum where these minerals are found lacking in the soil."

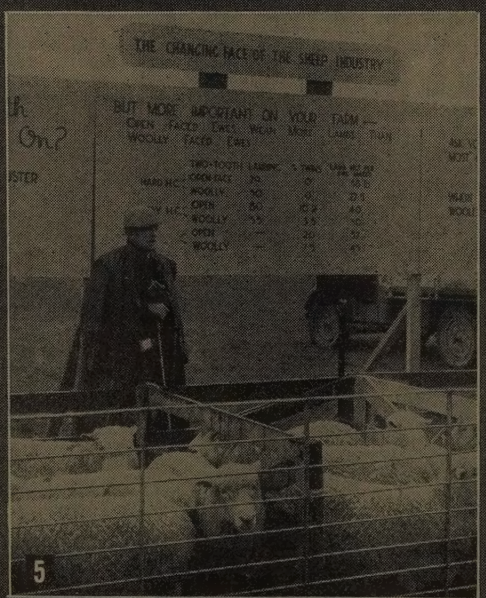
## Lowland Pastures

For intensive grassland farming on the lowlands, said Sir Bruce, two pasture groups were used:—

1. General-purpose permanent pasture to provide all-the-year-round general production as at present and

# Farmers' Field Day at Ruakura






1 and 4—Factors of inheritance and environment affecting production from dairy herds have been determined at a Ruakura dairy. A. H. Carter demonstrates the results of the scheme under which 2 heifer calves from each of 20 low-producing and 20 high-producing farms are sent to Ruakura and reared under identical conditions and their production measured. Identical twin sets from Ruakura are split between the high- and low-producing farms. There is thus an each-way check on whether differences are due to breeding or feeding. 2—Animated diagrams illustrate findings of Dr. W. G. Whittlestone regarding the milking process of the dairy cow which are the basis of Ruakura recommendations about milking techniques and shed management. 3—Two successive seasons of facial eczema losses in sheep have quickened farmer interest in the search at Ruakura for the toxic factor in pastures on which the disease occurs. D. D. Perrin and N. T. Clare discussed the principles of the chemistry of the search with large crowds and the management practices that have kept the Ruakura Station free of losses were shown. 5—The correlation of open faces in sheep and increased fertility is described by I. J. Inkster of the Hill Country Station. 6—J. D. J. Scott describes results of crossbreeding at the Station for the breeding into crosses of desirable inheritable characters of individual sheep breeds.

2. Special-purpose short- or long-rotation pasture to supplement the general-purpose pasture during winter and summer, with or without crops. He suggested half the farm in each type of pasture with perhaps 1/10 of the farm ploughed each year for crops, summer crops in the north and winter crops in the south.

"I do not think even the best of you can get much further with the one all-over general-purpose type of pasture, for the deficiency periods in these, cold of winter and heat of summer, are too great and the risk of dangerous toxic periods of growth is very real. True special-purpose pastures with their high clover content are risky from a bloat point of view, but it would seem as we build to high production with the standard permanent pasture dominated by perennial ryegrass—and we get this grass whenever and wherever we build to high production whether we like it or not—the risk of toxic periods of growth, particularly in the autumn recovery period under high temperatures and high humidity, is very great and very real.

**"In this regard, however, I cannot help but feel that farmers are not heeding the warnings and taking the advice of the Department of Agriculture, for I just cannot conceive that the Department's advice would cost an estimated £20,000,000 loss in one autumn season. That is a big lot of money for an efficient industry to lose and it represents a terrible lot of suffering by animals who cannot complain. This loss is not going to be avoided by pouring this and that down the throats of liverless animals, but by management to ensure that functional livers are retained in a healthy condition. The obvious thing is to avoid toxic material altogether, or restrict the amount of it available to stock and to substitute other feeds while the dangerous perennial ryegrass fields are in a toxic condition. Special-purpose pastures and summer crops will help in that direction."**

## Demonstrations at the Field Day

1. How to Rear Hoggets.
2. Why Crossbreed? Performance Tested Bulls.
3. Controlled Lambing on the Fat Lamb Farm.
4. Meat Production per Acre.
5. Face Cover and Productivity. Lice Can be Eradicated.
6. Milking Methods and Shed Design. Winter Management of the Dairy Herd.
7. The Basis of Efficient Pig Meat Production.
8. Sheep and Cattle Fertility.
9. New Zealand Dairy Board's Artificial Breeding Centre.
10. Controlled versus Uncontrolled Grazing; its Effect on Worm Burden of Calves, Time of Calving, and Lifetime Production.
11. Crossbred Beef Carcasses.
12. A New Method of Cultivation.
13. Silage Investigations. Calf Rearing Streamlined.
14. Why do Herds Differ in Production; Better Cattle or Better Farmers?
15. The Ruakura Diagnostic Section. Facial Eczema Research and Control. Worms in Sheep. Irrigation Equipment.

## Papers and Speakers

Opening Address, Sir E. Bruce Levy.

"The Management of Rams for a High Lambing Percentage."
- (a) "Ram Testing", D. G. Edgar, Veterinary Research Officer, Ruakura.
- (b) "Mating Behaviour", L. J. Lambourne, Research Officer, Ruakura.
- (c) "Management at Mating", I. J. Inkster, Research Officer, Ruakura.

"About Worms in Sheep", Daisy B. Filmer, Research Officer, Ruakura.

"Rearing Thrifty Hoggets", E. A. Clarke, Senior Research Officer, Ruakura.

"Guaranteeing 95 per cent. Calving in Beef Cows", D. McFarlane, Gisborne Veterinary Club.

"Patterns of Expenditure on New Zealand Sheep Farms", W. L. Keen, Senior Statistician, New Zealand Meat and Wool Boards' Economic Service.

"Farmers' Wills", R. Cato, Manager, Guardian Trust and Executors Trust, Hamilton.

"Diseases Encountered at the Ruakura Diagnostic Unit", D. C. Dodd, Diagnostic Officer, Ruakura.

"Crossbred Beef", C. P. McMeekan, Superintendent, Ruakura.

"Growing Late Summer and Autumn Fodder Crops for Sheep and Cattle", G. S. Robinson, Senior Lecturer in Field Husbandry, Massey Agricultural College.

"Soil Surveys and Their Use to the Farmer", H. S. Gibbs, Officer in Charge, Soil Survey, Department of Scientific and Industrial Research.

"Management of Pasture on Pumice Lands", P. W. Smallfield, Director, Extension Division, Department of Agriculture.

"Weed Control: Barley Grass, Clover Damage, and Brassica Crops", F. B. Thompson, Agricultural Chemist, Rukuhia Soil Research Station.

"The Successful Establishment of New Farmers", H. M. Caselberg, Supervising Valuer, State Advances Corporation, Wellington.

"Strip versus Paddock Grazing of Dairy Cows", C. P. McMeekan.

"The Relationship of Size and Yield to Efficiency of Cows", L. R. Wallace, Chief Nutrition Officer, Ruakura.

"Lessons from Twins", J. C. Gerring, Animal Research Extension Officer, Ruakura.

"The Effect on Production of Different Intervals between Milking", C. P. McMeekan, and P. J. Brumby, Research Officer, Ruakura.

"How I Would Run the Dairy Farm Piggery", D. M. Smith, Pig Research Officer, Ruakura.

"Feeding Calves Once a Day", J. C. Percival, Research Officer, Ruakura.

"Sulphite Silage", R. J. Lancaster, Biochemist, Ruakura.

"Lower Seeding Rates for New Pastures", J. R. Murray, Instructor in Agriculture, Hamilton.

"Facial Eczema in Dairy Herds", C. P. McMeekan.

## The Hills

"The development of the hills," said Sir Bruce, "rests largely on the clearance of secondary growths, aerial top-dressing with phosphates and other minerals where these are lacking, accompanied by oversowing of clovers and maybe some ryegrass and crested dogstail later, perhaps some subdivision, together with an applied full utilisation of all the feed produced by grazing of masses of stock, literally to hammer and to fertilise the country into grass.

## Research and the Farmer

"With both advances you need research . . . to record species production, seasonal movements of growth, excesses and deficiencies, palatability and nutritive value, seasonal spread of production, methods of utilisation and conservation to reduce feed value losses to a minimum, and the devising of management systems to counter the dangers attendant upon parasites and upon lush and rapid growth; to study the development of the hills under aerial topdressing, to define the need of legumes and the appropriate species of these, and to gauge the most opportune date and state to introduce the higher producing grasses if these are failing to put in an appearance on the country as the soil fertility increases; to record the results and guide the operations of these new factors in hill development. In all this the laboratories are of course essential, but we must never allow ourselves to forget that the field where the stock graze is our main laboratory.

"Research so often lags behind accomplishment and sets out belatedly to measure how good that accomplishment is.

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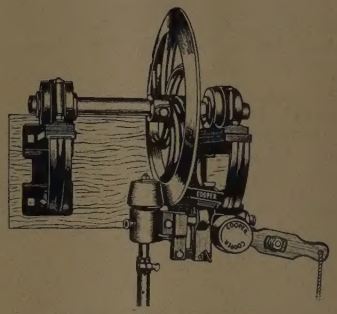

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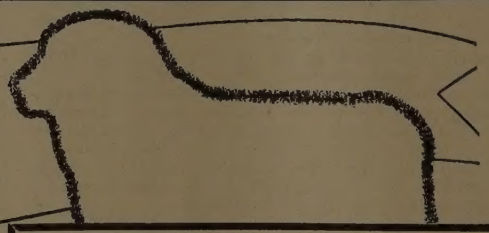

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My vision is more research leading the way and guiding the development, for in this way there is greater security and maximum efficiency in accomplishment."

Research, however, was of little value, concluded Sir Bruce, unless it was interpreted and put over to the man on the land by a strong, reliable, and co-ordinated extension service. "Agricultural education is vital to our national life from the University agricultural college, through the trained extension officer, to the farmer on the land. In my humble opinion the deficiency today lies in the extension service. There seems insufficient inducement for high-calibre men to train for agricultural extension work. The University agricultural colleges are starved for men to train for this service. . . ."

The intensive farming envisaged by Sir Bruce called, he said, for good labour and good direction. Farming was the greatest industry New Zealand had. The intensive development of the lowlands or the hills called not for a peasant type of farming, nor did it call for a ranch type of farming. It called for a big-business concept and set-up in farming in which there was an avenue open for brains, finance, and management efficiency as never before.

Photographs, except that on page 107, by Niederer.

# Retirement of Mr. S. Freeman

**THE Dominion organising secretary of the New Zealand Federation of Young Farmers' Clubs, Mr. Sydney Freeman, retired at the end of June after 22 years of service to the Y.F.C. movement. He was a Fields Instructor of the Department of Agriculture and had served the federation on a full-time basis since 1936 except for a period during the Second World War.**

MR. FREEMAN came to New Zealand in 1910 and worked on farms for 3 years. He farmed on his own account in the Rangitikei from 1913 to 1928 and in April of that year he entered the Department of Agriculture as an Assistant Fields Instructor at Hawera. In August 1928 he was transferred to Masterton.

In 1934 he formed the first North Island Young Farmers' Club at Ballance, and in 1936 he was transferred to Wellington as a Fields Instructor to be organising secretary to the Y.F.C. federation. In May 1942 he was sent to the Department of Agriculture's Flock House Farm of Instruction for 18 months to be in charge of the trainees. In October 1943 he was transferred to Palmerston North and he assisted with the Services Vegetable Production Scheme in the Wellington area.

Mr. S. Freeman.

At the end of the war Mr. Freeman was engaged in re-forming Young Farmers' Clubs and in April 1946 he was posted to Wellington as Dominion organising secretary of the federation.

At a gathering at the head office of the Department the Director-General of Agriculture, Mr. E. J. Fawcett, paid tribute to Mr. Freeman's work. He said that his history as the Y.F.C. organiser was an enviable one and his work among the Y.F.C.s had been extremely well carried out.

There were 86 clubs when the Department of Agriculture became associated with the Y.F.C. federation and the number rose to 206 by the outbreak of the Second World War. The exigencies of war reduced the total to 62, but at the end of the war, said Mr. Fawcett, Mr. Freeman did a great job in reviving clubs and forming new ones. At present there were 356 clubs—a record of which any man could be proud.

"We regard the Young Farmers' Clubs as a very fine movement. They are the backbone of the farmers of the future," said the Director-General. "You can look back with pride on your work in developing that movement."

Replying, Mr. Freeman said that he had seen the value of the Y.F.C.s to the farming community and to the Department. The confidence of the farmers in the Department and its work was due in no small measure to the work of the Department in Young Farmers' Clubs.

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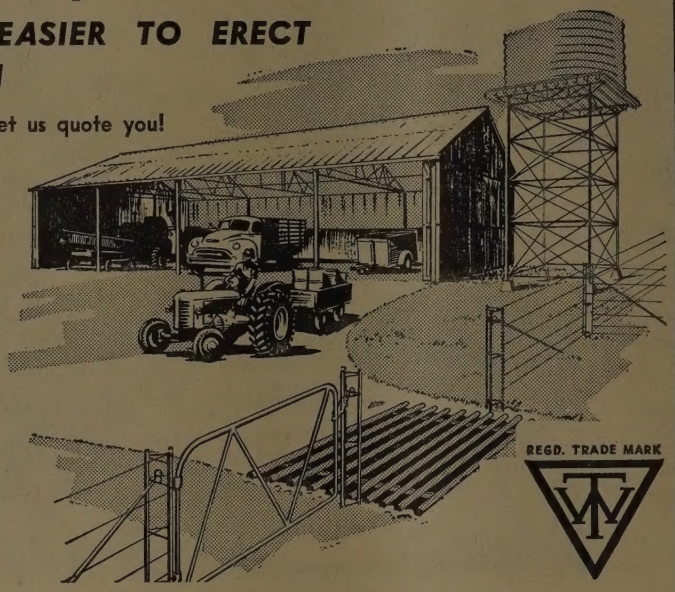

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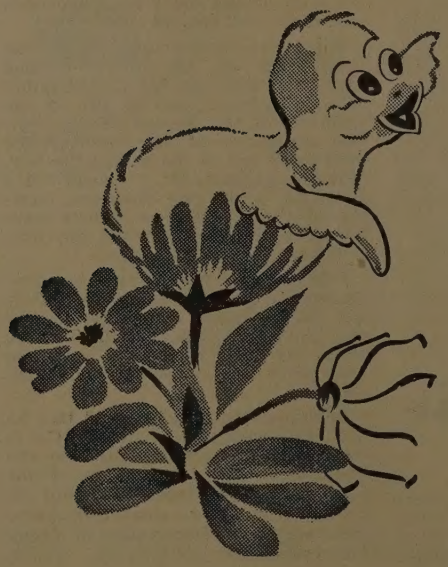

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# Double Fencing of Breaks in Pasture Grazing

By C. J. HAMBLYN,
Fields Superintendent, and
J. O. BRASELL,
Farm Machinery Instructor,
both of Department of Agriculture,
Palmerston North

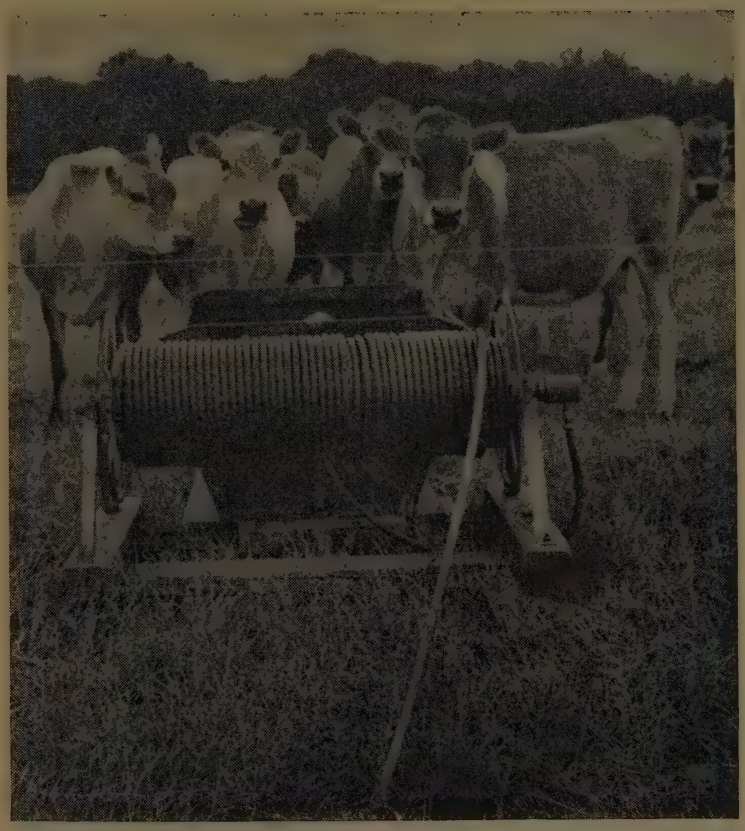
**BREAK or strip grazing of pastures with the breaks fenced off with a single-wire electric fence is now standard practice on most New Zealand dairy farms. Though some farmers practise strip grazing through most of the milking season, the majority use this method only in the grazing of autumn-saved pasture and during early spring until there is a flush of growth providing plenty of feed.**

FIELD observations of the recovery of pastures after strip grazing show that the last strips grazed often recover very quickly and are sometimes ready for grazing again as soon as the first-grazed strips, which may have been fed off a week or 10 days before. This quick recovery of the last strips in a paddock is particularly noticeable when autumn-saved grass is eaten off in June, July, or August. In experiments in Britain two fences have been used to define the breaks so that the cows are prevented from grazing and tramping the strips already fed off. Reports have shown that such pastures recover quicker and consistently produce considerably more feed than where only one fence is used.

There are, of course, serious practical difficulties in the use of two fences. Provision of water in each break or access to water from each break is one; another is the provision of easy access to each break, and a further one is that of shifting two fences or moving the back fence through to the forward position.

Despite these difficulties it was considered by the writers that recent developments in the use of autumn-saved grass in the wintering of dairy cows as demonstrated at the Department of Agriculture Ruakura Animal Research Station called for some investigation of the possibilities of using two fences for the breaks to see if quicker recovery (if this did occur) was of real importance and likely to justify the extra work involved.

The first and apparently the major problem was that of getting water easily to each break in turn. The agricultural engineering section of the Department undertook the development of suitable equipment using pliable plastic piping to convey the water. The illustrations show the prototype apparatus which was used in the field for the first time in the winter of 1955 on a small dairy farm in south Taranaki.



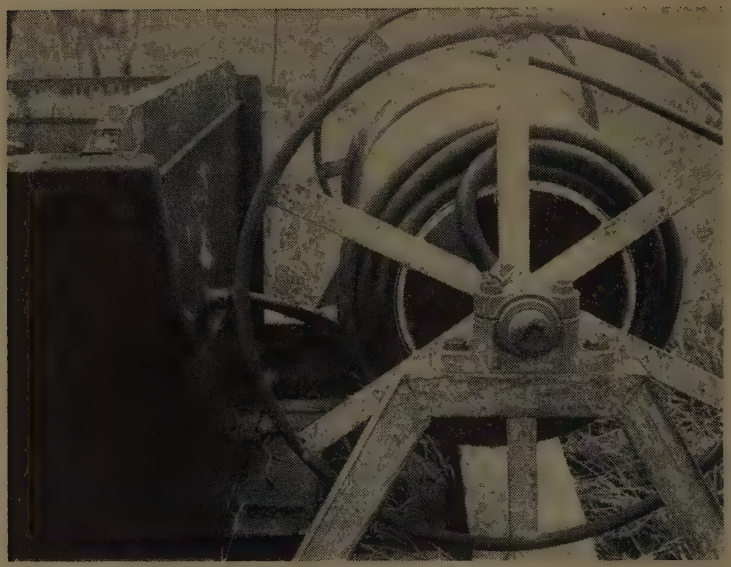
Taking water to stock in break feeding with a reel of plastic piping mounted with a water trough on a sledge.

The farm was selected for the initial trial not because it was the best for the purpose but because the farmer had a real problem in the wintering of his 47 cows on 60 acres with no feed reserves, except 18 acres of autumn-saved grass in two 9-acre paddocks. This farmer was therefore particularly interested, because if he had to use his autumn-saved grass to help the cows through winter, he did not know where to get grass to provide feed when they calved. It was agreed that if water could be taken to each strip in turn, the use of two fences, one in front and one behind the break, was quite feasible, with the dry cows at least. Whether it was worth while with the milkers could be judged on results.

## Trial of Water Supply Equipment

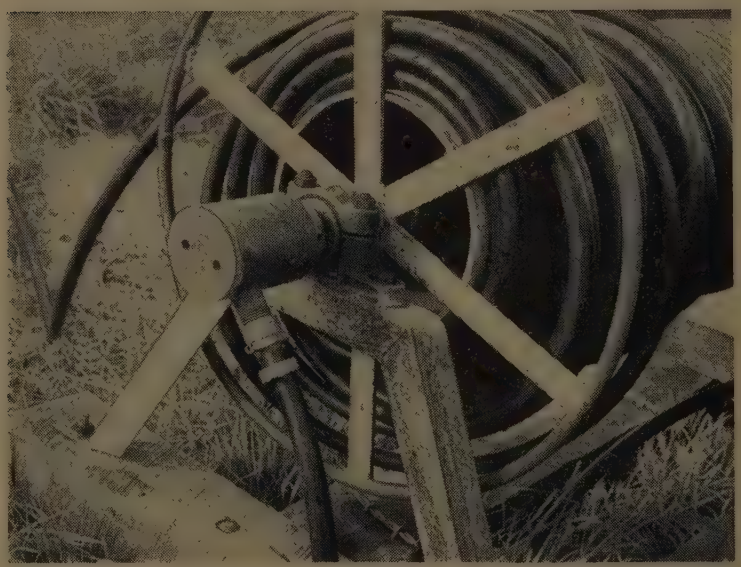
The water supply equipment consisted of a reel of plastic piping with a gland arrangement to pass the water from the piping to a portable water trough mounted on a sledge. By the time this was ready in June 1955 the first of the two 9-acre paddocks of autumn-saved grass had been grazed off in the usual breaks behind the single-wire electric fence.

For the grazing of the second paddock the double-fence system was used to define the breaks and the water supply was provided by connecting the plastic piping to the pipeline at the fixed water trough near the gate and pulling the sledge down the paddock as the breaks were shifted. The trough on the sledge was placed under one of the electric fences, and it was therefore necessary to move it every second day. The cows were, of course, dry at this time (mid-June), so that they remained on the breaks for 24 hours. As each break was fed



The water from the fixed water trough near the paddock gate passes from the pipe on the reel into the hollow axle, which rotates with the reel.

The special feature of the apparatus is the gland which passes the water from the hollow axle, at the other end from where it enters, to the water trough mounted with the reel on the sledge. The gland is prevented from rotating with the axle by the pipe to the trough.



off the back fence was moved forward to the front position. With a light single wire and suitable reel with light standards this was not a big job, the shifting of the trough, when necessary, and the fence taking about ½ hour.

By the time this second paddock was fed off in breaks the recovery made by the first breaks was such that the value of the double fence in the provision of more feed at this critical time of the year was very apparent. The results were sufficiently encouraging for the farmer to continue with the use of the double fence and portable water supply in the other paddocks in turn. When sufficient cows were in milk to warrant a change-over to break feeding of the milkers and paddock grazing of the dry stock this was done and was continued until the spring flush started and there was plenty of feed on the farm.

## Future Possibilities

The experience on this farm, admittedly not in any way conclusive, has been sufficiently encouraging to warrant further trials. It is proposed to carry out more detailed studies of the effect of using double fences in break feeding on several farms, including the two demonstration farms in Taranaki, next winter.

It appears possible that the double fencing could be used with advantage in winter grazing of autumn-saved grass as advocated by the Ruakura Animal Research Station, where up to two-thirds of the farm is closed for autumn-saved feed, and the feeding of hay and silage on the remainder is started in late April and May. In June the dry cows are break grazed on some of this autumn-saved grass which, even with the use of a single fence, recovers remarkably quickly and is ready for another grazing of fresh, clean feed in a few weeks.

It is very likely that the recovery would be much quicker with the two fences. In this event a farmer could confidently winter more stock or he might be able to provide pasture grazing for the cows, at least right through winter, and still have plenty of feed to start the milkers off in the new season.

This would bring the day of "no feeding out" on dairy farms appreciably nearer. The provision of a relatively cheap and efficient apparatus to provide necessary water in each break and the improvements in the portability and ease of erection of electric fences used for break feeding have made possible further investigation of the question whether the double fencing of pasture strips for restricted grazing is worth while at any particular time of the year.

# The Home Orchard in Spring

[*National Publicity*

IN spring the deciduous trees in the home orchard show signs of life after the dormancy of winter. Opportunity is taken to use this early sap movement for propagating and reworking fruit trees by grafting. When bud movement is apparent in the trees so too is emergence from dormancy of various pests and diseases affecting the trees. Characteristics of early growth, pests and diseases, and grafting are discussed in this article by S. P. Money, Horticultural Instructor, Department of Agriculture, Wellington.

THE first noticeable movement of fruit trees in spring is a swelling of buds. As this occurs soft tissue formerly protected by the bud scales is exposed as whitish bands round the edges of the scales. This can be seen only by close examination of a tree, but such a search is worth while not only to see something of tree growth, but to learn the precise time to apply protective sprays.

Efficient spraying to control pests and diseases is one of the most important measures adopted to secure maximum production of high-quality fruit from orchards, and the best results can be obtained only when sprays or dusts are applied at the proper time.

To facilitate the application of sprays during the early part of a season the following terms describing bud movement are applied in lectures and instructions on orchard culture.

**Bud movement** is the stage when buds are noticeably swelling and new tissue is continually being exposed.

**Green tip** is the condition when most of the leaf buds have begun to grow and the green tips of leaves are visible.

**Pink** denotes the condition of the blossom buds when they are showing colour and the individual blossoms are separated from one another enough to allow spray penetration.

**Petal fall** is when at least three-quarters of the petals have fallen from the tree and before the calyx has begun to close. At this stage of development spray will penetrate easily into the calyx.

## Regular Spraying Essential

An important point in control of diseases in fruit production is that once growth has started in spring it is continuous. Complete cover at all times is almost impossible and the home orchardist should apply frequent and regular sprays to keep protection as thorough as practicable. Disease control cannot be obtained by applying fewer but stronger sprays. Apart from the danger of burning there can be no extra protection of foliage owing to the growth factors previously described and fungous, bacteria, and insect pests gain a foothold on exposed unsprayed tissue.

The peach curl fungus, *Taphrina deformans*, is an example of how a fungus can be denied entry by spraying at the right time. The fungus is thought to enter the leaf tissue while it is still in the bud stage. The spore germinates and the hyphae or fungous threads penetrate the new tissue. If this tissue is protected by a covering of bordeaux mixture, the fungus is killed when it makes contact.

Similar measures are necessary against the depredations of insects. An important destructive insect in the home garden is codling moth (*Cydia pomonella* L.), which causes considerable damage in apples and pears. These moths begin life as eggs laid by the parent moth on leaf and bark surfaces usually near flowers and food supply. Later in the season the eggs are also laid on larger fruit surfaces.

The young insect is a caterpillar growing to ½in. or more long. It is a chewing insect with powerful jaw mechanism and soon pierces the fruit through the skin or calyx to tunnel through the flesh into the seed cavity. The seeds are eaten, and sometimes if the caterpillar is not ready to pupate, it will emerge and then attack another fruit.

When the insect has completed its feeding in the caterpillar stage it finds a crevice in the bark of a tree or another suitable place and spins a web about itself to become a chrysalis. Emergence from the chrysalis as an adult moth occurs 1 to 3 weeks later. The adults immediately mate and the females begin laying eggs. The period

## Hoeing under Trees

ORCHARD hygiene can be assisted in early spring by a thorough hoeing beneath the trees. This helps reduce any fructifications which may be emerging from brown rot "mummies", the overwintering bodies for this fungus. Loosening surface soil at this time also allows easier penetration of fertiliser applications.

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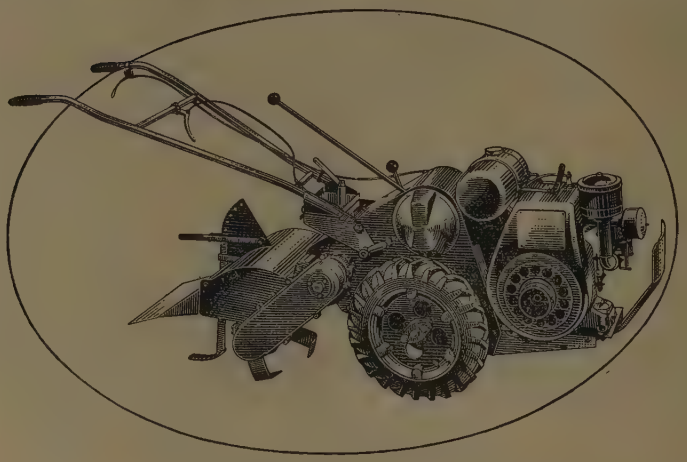

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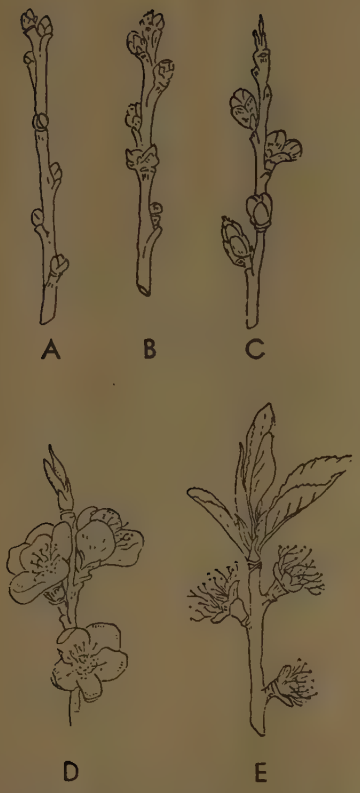



Stages of blossom development of the peach. A—Dormancy. B—Bud movement. C—Pink. D—Full bloom. E—Petal fall.

of this cycle varies according to weather, but generally it takes about 3 weeks.

**If it is not checked early in the season, the codling moth multiplies to such an extent that it can almost entirely spoil crops of pip fruit.**

The best control is gained by beginning spraying early in the season and by keeping a continuous cover of spray material on the plant to kill the emerging caterpillars when they begin to feed. The earliest spray is applied at petal fall; that is, when at least three-quarters of the petals have fallen from the trees.

**Spraying should not be done earlier than this, for these sprays will also kill bees which visit the tree for nectar and pollen.**

The range and complexity of spray materials on the market today make a choice of them difficult for the home orchardist. Many of these sprays are not compatible with others and many require careful handling. The simple spray schedule on the right is quite satisfactory for home orchard fruits. The quantities shown should be used to prepare 4 gallons of spray.

## SPRAY SCHEDULE FOR THE HOME ORCHARD

| Time of Application | Treatment | Pest or Disease |
|---|---|---|
| **Apples** | | |
| Early green tip | Bordeaux mixture: Bluestone 6½oz., hydrated lime 5oz. | Black spot, powdery mildew |
| Open cluster to pink | Lime sulphur ⅓ pint | Black spot, powdery mildew |
| Petal fall | Lime sulphur, ¼ pint, lead arsenate powder 1½oz., hydrated lime 3oz. | Black spot, powdery mildew, codling moth |
| Two weeks after petal fall; repeat every 18 to 21 days until end of February | As for petal fall spray | Black spot, powdery mildew, codling moth, bronze beetle, leaf roller caterpillar |
| **Pears** | | |
| Early green tip | Bordeaux mixture: Bluestone 6½oz., hydrated lime 5oz. | Black spot |
| Open cluster to pink | Bordeaux mixture: Bluestone 1½oz., hydrated lime 2½oz. | Black spot |
| Petal fall | Bordeaux mixture as for the previous spray, plus lead arsenate powder 1½oz. | Black spot, codling moth |
| Two weeks after petal fall; repeat every 21 days until end of February | As for petal fall spray | Black spot, codling moth, leaf roller caterpillar, pear slug |

The programme recommended for apples may be substituted for that for pears, especially on tender varieties susceptible to russet.

| | | |
|---|---|---|
| **Stone Fruits** | | |
| Blossom-bud movement. It is important to apply this spray at the right stage for control of leaf curl | Bordeaux mixture: Bluestone 6½oz., hydrated lime 5oz. | Leaf curl, shot hole, bladder plum |
| 10 to 14 days later | Bordeaux mixture: Bluestone 4oz., hydrated lime 5oz. | As this spray is mainly for leaf curl, it may be omitted if the disease is not troublesome |
| Late pink | Lime sulphur ⅓ pint | Brown rot |
| Petal fall; repeat every 3 to 4 weeks until 2 weeks before picking | Lime sulphur ¼ pint | Brown rot, shot hole, leaf rust |

For apricots substitute colloidal sulphur, 2oz., for the lime sulphur sprays.
For the control of leaf roller caterpillar and pear slug on plums and cherries (about January-February) add ½oz. of basic lead arsenate to the sprays due about that time.

| | | |
|---|---|---|
| **Citrus Fruits** | | |
| For lemons only before the blossoming of the main crop in October | Bordeaux mixture: Bluestone 4oz., hydrated lime 5oz. | Verrucosis, melanose, grey scab, wither tip |
| Petal fall of main crop (November) | Bordeaux mixture as above | Verrucosis, melanose, grey scab, wither tip |
| **Berry Fruits (other than Strawberries)** | | |
| Green tip (about September) | Bordeaux mixture: Bluestone 6½oz., hydrated lime 5oz. For raspberries and loganberries add lead arsenate powder 1½oz. | Leaf spot, cane wilt, bud moth |
| November and after the fruit has been picked | Bordeaux mixture: Bluestone 4oz., hydrated lime 5oz. For raspberries and loganberries add lead arsenate powder 1½oz. | Leaf spot, cane wilt, bud moth |

**Strawberries**

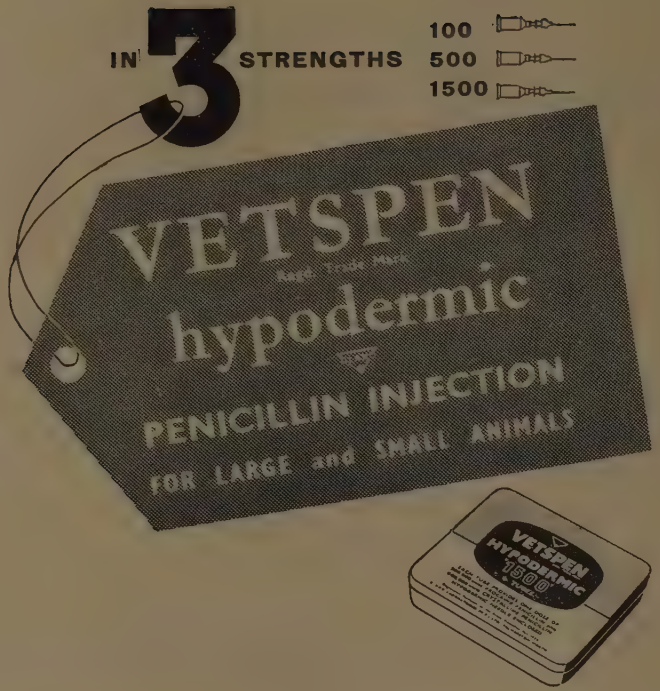
For control of leaf spot apply Bordeaux mixture (bluestone 4oz., hydrated lime 5oz.) in August and repeat a month later. If red mite is present the second Bordeaux spray may be replaced by lime sulphur (¼ pint to 4 gallons of water).

## GRAFTING FRUIT TREES

The home orchardist may find grafting an interesting and convenient way to grow more than one variety on a tree, to graft a known variety on a seedling tree, or to rework an established tree of an unsatisfactory variety.

The grafting is done in late spring instead of in autumn as for budding, and a scion is commonly used composed of several buds instead of the one bud inserted in budding. One principle is similar, however, and that is the union of the two cambiums.

The cambium in a plant is a layer of cells capable of the continued division responsible for increasing the girth of the trees. The cambium encircles the stem between the wood

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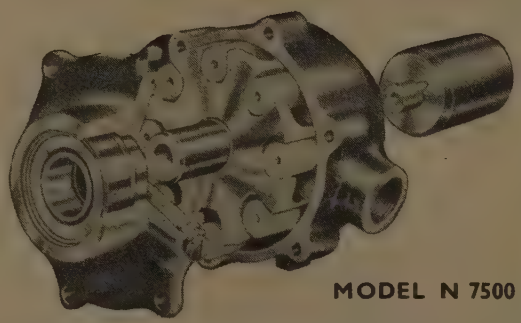

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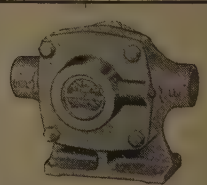

MODEL N 6000

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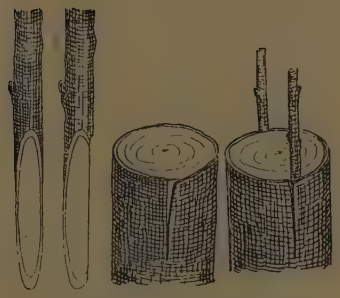
Stages of apple blossom development. A—Green tip. B—Pink. C—Full bloom. D—Petal fall. E—Calyx closed.

and the bark and when damage occurs on the limbs of a tree this tissue by division of its cells is mainly responsible for healing the wound. Thus when the stock which is to be grafted is cut and the scion shaped both cambiums of these two woods are induced to become active, and if they are firmly placed together, a continuous union will result.

## Grafting Tools

The tools needed for grafting are a strong, thin-bladed knife, secateurs, tack hammer and tacks, raffia, and a sealing compound such as grafting mastic or heavy petroleum jelly. Both grafting mastic and petroleum jelly have superseded grafting wax, but petroleum jelly is probably the most convenient for home orchardists.



The rind or bark graft.

## Scions

The wood to be used for grafting should be selected with care. Scions should be taken only from those trees with a good cropping record. They should be free from disease, particularly silver leaf, powdery mildew, and scale.

The wood should be of the previous season's growth only. The terminal buds should be left intact. The wood should be collected as late as possible to shorten the storage period, but it should still be dormant. The scions should be a little thicker than a lead pencil and allowance made for discarding a portion at each end. If more than one variety is being gathered, scions should be carefully labelled as each variety is collected to prevent their being mixed.

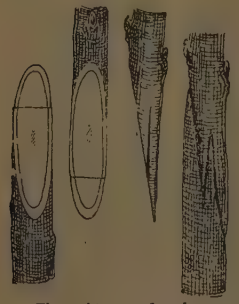
For storing grafting wood satisfactorily moisture must be just sufficient to keep it from drying out. Wet sawdust and sand are generally suitable, but if a well-drained bed of light soil is available on the south side of the house, the wood can be heeled in there. In areas where heavy frosts occur the scions should be covered.

## Methods of Grafting

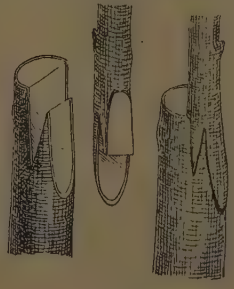
Two kinds of grafting are most practised by home orchardists. These are grafting to nursery stock or to light lateral growth and grafting to established trees which have been headed back.

The whip graft is used for nursery stock or any other thin growth where the scion and stock are the same size or where the stock is only slightly larger.

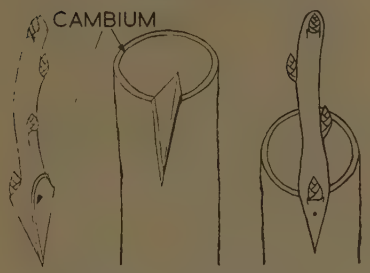
The cut for a scion being whip grafted is made diagonally across the scion and slightly below and opposite a bud so that the bud will be fairly



The whip graft when stock and scion are the same thickness.



The whip graft when stock is thicker than scion.



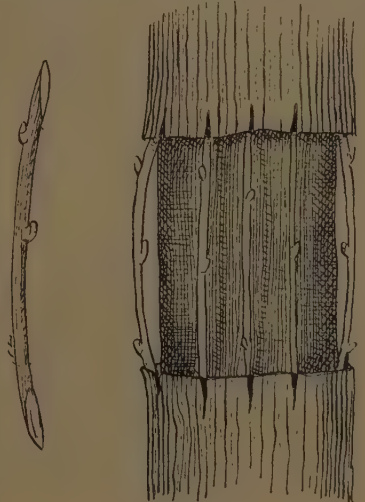

A notch graft. Careful cutting is essential to get a union of cambiums.

close to the union but far enough above to be clear of tying material. Next a cut is made through the face of the previous cut as shown in the illustration at left below. The scion and stock are then fitted together as shown, tied with raffia, and sealed with a sealing compound. Where the stock is larger than the scion the second cut is wider, as can be seen by comparing the illustrations.

For an established tree which has been headed back the rind or bark graft is most commonly used. The scion is prepared as in the first cut of the whip graft, but for the rind graft it is flattened on one edge. A vertical cut is made in the bark of the stock and one side is lifted for insertion of the scion. The flat edge of the scion is closely pressed against the unlifted portion of the bark as shown in the centre illustration above. The two are then tacked or bound and are sealed.

## Notch Graft

For the notch graft a wedge-shaped cut is made in the top of a stock into which a similar shaped scion is inserted. If possible, a bud should be retained in the V portion of the scion



The bridge graft.

**The simplest way of grafting fairly small trees is to head them well back and notch graft.**

so that if the scion is snapped off, there is still tissue to continue growth. Careful cutting is required for this graft and some practice on some of the removed branches may be advisable before grafting is started.

### Bridge Grafting

Bridge grafting is used to bridge a gap on a tree where the trunks or limbs have been damaged to the extent that there is a danger of death through ring barking. Scions for this graft are prepared in a manner similar to that for rind grafting except that scions are shaped at both ends. The bark may have to be pared back on both sides of the damaged portion to healthy tissue. The scions are inserted, tied, and sealed as for a rind graft. There are many other types of graft used for refurnishing, but these are more useful to commercial than home orchardists.

### CHANGES OF ADDRESS OF "JOURNAL" SUBSCRIBERS

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## Safety Glove for Tractor Drivers on Roads

THIRTEEN tractors were involved in accidents on highways in 1955. A suggestion for a driving glove for tractor drivers when on roads is shown in the illustration above and consists of a white cotton glove with red luminous tape attached to the back of it. The luminous tape is fitted into a pocket stitched on the back of the glove and this allows new tape to be fitted when required. When the arm is extended the glove is a good indicator of change of direction to others on the road either by day or night.

*—C. M. B. OLIVECRONA, Machinery Instructor,*
*Department of Agriculture, Wellington*

## Meteorological Records for June

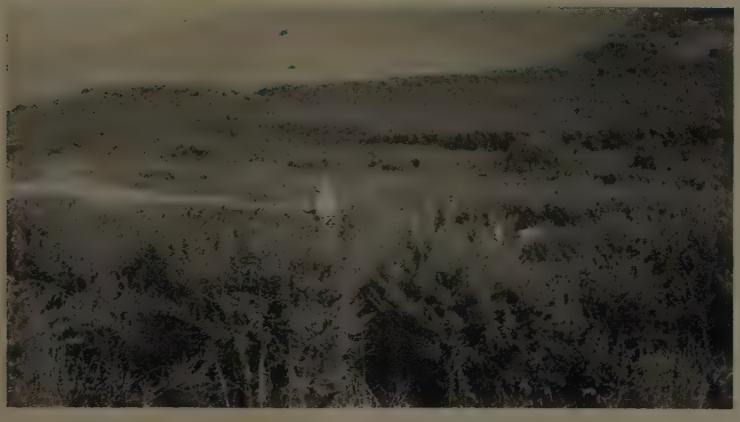
| Station | Height of station above M.S.L. (ft.) | Air temperatures in degrees (Fahrenheit) | | | | Rainfall in Inches | | | | | Bright sunshine hours |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Approx. mean | Difference from normal | Absolute maximum and minimum | | Total fall | No. of days of rain | Difference from normal | Maximum fall | | |
| | | | | Maximum | Minimum | | | | Amount | Date | |
| Kerikeri | 201 | 55.6 | + 3.5 | 68.7 | 35.8 | 11.96 | 22 | + 4.88 | 3.94 | 11 | 126 |
| Auckland | 160 | 55.6 | + 2.6 | 67.1 | 37.7 | 9.99 | 23 | + 4.60 | 2.39 | 2 | 102 |
| Tauranga | 10 | 52.0 | + 2.1 | 64.6 | 27.9 | 7.28 | 19 | + 1.73 | 2.08 | 2 | 132 |
| Ruakura | 131 | 50.4 | + 2.9 | 64.4 | 25.8 | 12.71 | 23 | + 7.93 | 2.59 | 3 | 97 |
| Rotorua | 975 | 48.6 | + 2.2 | 62.2 | 28.2 | 11.89 | 18 | + 6.57 | 2.37 | 13 | 110 |
| Gisborne | 12 | 51.8 | + 3.0 | 66.2 | 28.1 | 2.36 | 18 | — 1.85 | 0.57 | 13 | 138 |
| New Plymouth | 160 | 52.8 | + 2.7 | 64.0 | 34.0 | 12.71 | 24 | + 6.53 | 2.18 | 6 | 100 |
| Karioi | 2125 | 44.0 | + 2.5 | 60.4 | 23.0 | 8.19 | 18 | + 3.09 | 1.10 | 19 | |
| Napier | 5 | 51.0 | + 2.3 | 64.9 | 28.8 | 3.56 | 15 | + 0.50 | 1.98 | 2 | 130 |
| Wanganui | 72 | 50.8 | + 2.0 | 63.8 | 33.3 | 4.22 | 16 | + 0.83 | 0.84 | 19 | 84 |
| Palmerston North | 110 | 49.7 | + 2.7 | 65.8 | 30.4 | 5.58 | 17 | + 1.23 | 1.12 | 19 | 76 |
| Waingawa | 340 | 47.2 | + 1.8 | 64.0 | 27.0 | 4.95 | 18 | + 0.86 | 0.93 | 2 | 102 |
| Wellington | 415 | 49.9 | + 2.2 | 60.6 | 37.3 | 5.41 | 18 | + 0.76 | 0.98 | 2 | 98 |
| Nelson airfield | 5 | 46.6 | + 2.5 | 60.9 | 27.2 | 4.92 | 14 | + 1.63 | 1.26 | 12 | 123 |
| Blenheim | 12 | 47.2 | + 2.3 | 64.1 | 27.6 | 3.22 | 12 | + 0.74 | 0.70 | 17 | 142 |
| Hokitika | 15 | 48.0 | + 3.7 | 62.0 | 28.9 | 14.03 | 14 | + 5.20 | 3.19 | 12 | 92 |
| Hanmer | 1270 | 40.8 | + 1.1 | 63.0 | 24.0 | 5.22 | 15 | + 1.73 | 0.87 | 18 | 99 |
| Christchurch | 22 | 45.7 | + 2.5 | 66.0 | 27.3 | 1.13 | 12 | — 1.46 | 0.28 | 3 | 117 |
| Ashburton | 323 | 44.5 | + 2.7 | 65.4 | 26.4 | 0.77 | 5 | — 1.83 | 0.45 | 3 | 119 |
| Timaru | 56 | 43.7 | + 1.3 | 64.8 | 25.0 | 0.60 | 6 | — 1.27 | 0.19 | 2 | 118 |
| Alexandra | 520 | 39.6 | + 1.9 | 63.3 | 23.5 | 0.82 | 8 | + 0.03 | 0.19 | 17, 21 | 88 |
| Taieri | 80 | 45.6 | + 3.8 | 65.8 | 25.0 | 2.59 | 13 | + 0.27 | 0.76 | 21 | 75 |
| Invercargill airfield | 0 | 43.4 | + 1.8 | 60.7 | 24.5 | 4.15 | 19 | + 0.50 | 0.85 | 21 | 72 |
| Chatham Islands | 140 | 47.8 | + 1.3 | 58.9 | 34.8 | 5.78 | 25 | + 1.88 | 1.20 | 18 | |

A general view of the trial area, showing practically complete recovery of gorse 12 months after it was sprayed. The area sprayed from a helicopter is in the centre, that sprayed from an aeroplane is at extreme left, and that ground sprayed is at extreme right.

# Aerial Application of Weedkillers to Gorse

By L. J. MATTHEWS, Weeds Research Officer, and P. B. LYNCH, Crop Experimentalist, both of Department of Agriculture, Wellington

IN 1954 about 76,000 gallons of spray mix were applied by aeroplane to gorse in New Zealand. In most cases, however, the gorse was only checked temporarily, no permanent control resulting. In many cases owing to the poor results obtained no attempt was made to replace the gorse with more desirable vegetation to ensure that the areas would not revert to gorse or to equally undesirable weeds such as blackberry or bracken fern. In this article the aerial spraying of gorse is evaluated and recommendations are made for its use.



The ground spraying unit in operation.

THE most successful way of turning gorse-infested country into productive pastures is by cultivation. Where cultivation is not practicable chemical methods of killing gorse should be considered. This usually limits the places where chemicals should be used to control gorse to waste areas, to areas that cannot be readily cultivated, and to seedling and regrowth gorse in new pastures, whether these follow ploughing or surface seeding.

## Control by Chemicals

The most successful chemical used to date for the control of gorse is the oil soluble ester of 2,4,5-T. For use of this chemical from the air the basic factors discovered from its use by ground application still apply. These are:—

(a) A complete foliage cover is essential. Any areas or parts of plants missed usually regrow.

(b) Gorse can be killed only at certain growth stages. Seedling and regrowth gorse up to a few feet high is the most readily killed. If regrowths are sprayed too soon after burning or chopping, results are poor. Semi-mature gorse is fairly difficult to kill, particularly if growing in compacted areas, because complete foliage cover is difficult to obtain and "old man" gorse cannot usually be killed by one application. Dormant buds usually regrow after spraying.

# Aerial Spraying of Weedkillers

A general view of the area 2 months after the gorse was sprayed.

A general view of the trial area, showing tho aeroplane spraying the gorse.

# on Gorse

This view shows the average height of the gorse which was sprayed. →

← A close-up of gorse 2 months after being sprayed from an aeroplane, showing the effects of incomplete coverage.

A close-up of gorse 2 months after → being sprayed from a helicopter, showing the effects of incomplete coverage.

Spraying equipment fitted on a Moth aircraft. Left—Boom nozzles. Right—The propeller for driving the spray pump.

(c) Gorse is most readily killed between the spring and autumn flowering period. Complete foliage cover is more difficult to obtain if gorse is in heavy flower, and high rates of application of 2,4,5-T are required if the gorse is sprayed in late autumn and winter.

(d) Older gorse requires a higher rate of application of both 2,4,5-T and carrier to obtain a complete foliage cover and kill.

(e) Carriers such as water which are not toxic to plants give better results than toxic carriers such as kerosene and diesel fuel.

(f) Oil soluble esters of 2,4,5-T are very toxic to red clover, white clover, and to a less extent subterranean clover.

Most of these factors are difficult to overcome when 2,4,5-T is applied from the air. Over country too steep to be cultivated or burnt aircraft are forced to fly at a considerable height above ground level. This coupled with the fact that only a limited amount of carrier can be used creates problems. Atomisation of spray particles leads to excessive spray drift; hence larger quantities of carrier and less suitable carriers such as diesel fuel have to be used. A large droplet size is necessary and this leads to poorer penetration and poorer foliage cover. This has not only been demonstrated in practice but also in detailed experimental work.

Some of these difficulties may be reduced by the adoption of slower-flying aircraft such as the helicopter or by increasing the amount of carrier that can be dropped in a single run. Usually on steep country the helicopter is forced to fly at about 25 miles per hour, which is above its coning (almost hovering) speed, so that even this aircraft cannot take full advantage of atomising spray particles to give better penetration and reduce the amount of carrier required.

## Trial at Whatawhata

In March 1955 a detailed trial was made with aerial application from a helicopter and an aeroplane, and with ground spraying to an area of gorse near Whatawhata. Full details are published elsewhere (1), but results indicated that on tall gorse, 6ft. to 8ft. high, even the helicopter flying repeatedly over an area did not secure good penetration of spray to the base of the plants.

It is necessary to emphasise that this trial did not aim at comparing differ-

A helicopter fitted with a spray boom coming in to land.

ent means of application of spray to kill gorse of this type. Except as a "scorching" spray before burning, application of chemicals to gorse of the size treated would not be recommended. Such growth did, however, provide a useful means of comparing the machines used in terms of efficiency of cover and ability to drive spray into dense gorse. Measurement of distribution and penetration of spray was made by means of sensitised cards placed in various ways within the gorse, and the superficial browning of the gorse after spraying gave additional information.

Measurements were made both of single runs of the helicopter and aeroplane and also of the effect of overlapping runs in a "commercial" operation. The swath width from a single run of the helicopter was about 60ft., and that of the aeroplane about 110ft. The density of spray for a single run was consequently considerably greater with the helicopter. The spray distribution across a single swath was more even with the helicopter and the wind drift of spray was much less. With both machines, however, the amount of spray penetrating into the bushes fell off rapidly in the interior of the bushes.

The helicopter gave a more even mixture of droplet sizes than did the aeroplane. With the aeroplane the fine droplets were carried downwind considerable distances while the coarse droplets fell more or less under the track of the machine. There was a tendency for the fine droplets to penetrate better into the interior of the gorse bushes than did the coarse droplets.

Many of these differences between the machines disappeared when the "commercial" operations were compared owing to the effect of overlapping runs and exceptionally skilled flying by the pilot of the aeroplane. There is no doubt, however, that spray drift is much more likely with this machine than with the helicopter.

Subsequent observation of the gorse indicates that the aerial application has given at least as good results as the ground spraying, but that none of the methods gave a satisfactory kill, as regrowths appeared in all cases. This is particularly interesting, as though the same acid equivalent was applied in all cases (3.6lb. per acre), both aerial methods applied this in 28 gallons of spray mix per acre, and the ground unit applied 900 gallons per acre. Water was the carrier used in all cases. It is obvious that there is no particular merit in high-volume, "drenching" sprays. Water has no weedkilling properties and the only thing that really matters is how well the active weedkilling ingredient is distributed over the plants to be treated.

## Place of Aerial Spraying

Even if future developments prove that gorse can be killed easily from the air on hill country too steep to be cultivated, the problem of turning the area into productive pasture must still be faced. If gorse could be killed satisfactorily from the air on this type of country, it might be best to leave the area after spraying until the gorse opens up sufficiently to allow oversowing, fertilising, and stocking. As this is not yet possible on most types of gorse treated, the best method is probably to burn, oversow and topdress, stock, and spray the regrowth gorse, preferably by spot application, a year or so later. One disadvantage of this method is that the burnt gorse sticks may take several years to rot. To get a clean burn, including the gorse sticks, a light aerial application of 2,4,5-T in diesel fuel some months before burning dries the gorse out sufficiently for good results to be obtained, particularly with a slow back burn. Either a helicopter or an aeroplane is suitable for this application.

Even if this method is adopted, regrowth gorse will still have to be treated a year or so later. To avoid excessive clover damage the regrowth gorse should, if possible, be treated by spot application. However, if an over-all application is to be made, the helicopter has advantages over the aeroplane because this type of aircraft can do more precise spraying and spray only the areas of dense regrowth gorse.

Sensitised cards fixed to gorse for measurement of spray distribution.

## Recommendations

1. To date most gorse on country too steep to be cultivated cannot be successfully killed from the air with one spraying of 2,4,5-T.

2. Only gorse of a type of growth that can be successfully treated by ground application should be sprayed from the air.

3. The use of aerial spraying is warranted in many cases to get a good burn of gorse preparatory to oversowing.

4. To minimise clover damage spot treatment of seedling and regrowth gorse in new pastures is preferable to aerial application. However, if this is not possible, aerial applications may be worth while in some instances. A good coverage of such gorse is relatively easy to obtain and it may be possible to re-introduce the clovers later by oversowing.

### Reference

P. B. Lynch, L. J. Matthews, and F. B. Thompson, "New Zealand Journal of Science and Technology", Vol. 37, No. 6A, April 1956.

# Work in the Home Garden

[*Green and Hahn*

**SEED sowing is one of the most urgent tasks in September, as practically everywhere ground temperatures are rising and are high enough in most districts to enable hardy vegetables to grow well. In a few districts the ground warms enough during the month for seed of frost-tender plants such as cucumbers, dwarf and runner beans, pumpkins, marrows, and squash to grow outside, and where killing frosts are unlikely or can be guarded against first sowings of these vegetables may be made. In this article A. G. Kennelly, Horticultural Instructor, Department of Agriculture, Dunedin, discusses work in the vegetable garden in September.**

IN most districts only hardy vegetables can be sown in the open in September. In gardens which are reasonably well sited and where the soil is not too wet and has been worked so that it is friable and aerated a sowing can be made of plants such as asparagus, beetroot, carrots, summer cabbages and cauliflowers, leeks, lettuces, parsnips, peas, rhubarb, radishes, silver and spinach beet, spinach, turnips, and most herbs. Cabbages and cauliflowers, silver beet and spinach beet, globe, Chinese, and Jerusalem artichokes, onions, shallots, and, in some districts, early potatoes can be set out.

Pea seedlings can be protected from birds by tying lengths of cotton over them. Gaps can be filled in earlier-planted crops. In exposed situations broad beans can be supported, if required, by strings tied at suitable heights to stout stakes placed at 5ft. or 6ft. intervals. They may also need to be sprayed with an insecticide, such as nicotine sulphate or lindane, against black aphis, which commonly infests the growing points in September or October.

In poor soils established crops such as silver beet, cabbages, and cauliflowers can be stimulated into more vigorous growth by topdressing with nitrogenous fertiliser or where soil drainage and temperatures are favourable by a weekly application of liquid manure.

Commercial growers usually calculate their fertiliser applications at a given number of hundredweights per acre. The more concentrated mineral fertilisers are usually applied at 1cwt. to 2cwt. per acre, mixed fertilisers at about 2cwt. to 4cwt. per acre according to needs, and organic fertilisers such as blood and bone at up to 8cwt. or even a ton per acre sometimes. Home gardeners can assess comparative dressings per square yard from the following table:—

| Fertiliser per acre | Approximate equivalent rate per square yard |
|---|---|
| cwt. | oz. |
| 1 | ⅓ |
| 2 | ⅔ |
| 3 | 1 1/10 |
| 4 | 1½ |
| 5 | 1⅔ |
| 6 | 2 |
| 7 | 2½ |
| 8 | 3 |
| 9 | 3⅓ |
| 10 | 3¾ |

## Seed Sowing

Though preparation of the seed-bed and the sowing of seed are comparatively simple, the principles governing them are often little understood and the work itself is imperfectly done. Attention should be given to the following points:—

1. If the soil sticks to the boots when walked on, it is not advisable to sow.

2. Ground ready for sowing should be lightly forked over if a considerable amount of rain has fallen since it was dug. After this it should be lightly refirmed by shuffling across it to eliminate air pockets and the surface then raked fine. Lumpy soil should be broken with the rake and all stones and other foreign matter removed.

3. Seed should be sown thinly, as germination of most seed sold by reputable seedsmen is good, and thick sowing inevitably means waste of seed and of time required in thinning.

4. Seed depth is very important, particularly with fine seed. For most seeds the depth recommended on the packets should be followed closely, but with some a little latitude is permissible. For instance, in sandy or fine dry soil or in summer, when the soil is warm, seed can be sown a little deeper. In heavy soil which is inclined to retain its moisture or where the ground is cold sowing should be a little shallower than normal.

5. As germinating seed is very sensitive to temperature, sowing should be kept to a minimum if there is a doubt about soil temperatures being high enough for good growth.

[*Green and Hahn*

For seed sowing, soil should be well worked and in good condition.

## Asparagus

Asparagus can still be set out where seedling plants for transplanting are not too far advanced and where the soil is in good condition. Most established beds can be stimulated into more vigorous growth by topdressing with nitrogenous fertiliser or, where soil is not too wet, with liquid manure.

## Carrots

A successional sowing of carrots, and in some districts the main sowing, can now be made as advised in last month's "Journal". The intermediate or stump-rooted types are probably most popular. When sown thinly on light, free-working soils such types should not need thinning.

Carrots thrive in deep, rich, well-drained and well-cultivated soils of good humus content. Fresh animal manure is best avoided unless it is finely mixed with the soil.

Popular varieties include Red Cored Chantenay, Taranaki Strong Top, and Nantes.

## Globe Artichoke

The globe artichoke is the only true artichoke. It is occasionally known as the burr or french artichoke. (The "artichoke" most widely known and grown in New Zealand is actually a tuberous-rooted sunflower.) In countries overseas where globe artichokes are more commonly grown than in New Zealand there are two important varieties, Purple Globe and Green Globe, as well as strains of less importance, but few seedsmen in New Zealand carry stocks of different varieties.

[*Green and Hahn*

The buds of globe artichokes may be prepared for the table in a number of ways; the small side buds may be eaten raw or fried, but the main bud is usually boiled and the fleshy inner and outer bracts or floral leaves are eaten rather after the manner of asparagus.

Globe artichokes are hardy on well-drained soils in most parts of New Zealand, as the vegetative parts can withstand several degrees of frost and the roots even more severe temperatures. Where winters are very cold plants should be lightly earthed up during prolonged cold, wet periods.

They succeed best in districts where the winters are moist and mild even though fairly cool, as under such conditions the edible bracts, which enclose the flower head tightly, develop well, though flower development is slow. Where winters are severe bud development is late, and if temperatures are high in summer, the edible stage quickly passes, as the floral organs develop quickly and the succulence and tenderness of the edible parts are soon gone.

Artichokes grown from seed of an unknown stock are sometimes disappointing, but a good stock can be perpetuated if the plants are grown from suckers. However, plants from suckers rarely thrive as well as plants grown from seed, especially in a dry season. Suckers should be planted firmly and deeply when about 9in. high; this is usually in late September or October.

Edible flower heads can be produced the first year from seed sown under glass in August if cultural conditions are good. Alternatively seed can be sown in September or October in drills 12in. apart and the plants later thinned to 8in. apart. Early the

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following season the plants should be set out in their flowering positions 30in. apart in rows 4ft. apart.

Rich and deeply cultivated soil is preferable, though the plants will grow and produce flower heads in almost any well-drained soil that is not permitted to dry out. In late autumn the stalks should be cut to within about 1ft. of the ground and if the plantation is to remain, it should receive a liberal dressing of organic manure.

A plantation of artichokes may last up to about 5 years in rich soil, but on poorer soil results are likely to be disappointing after 2 years. Each year after establishment plants should have all but four of the strongest suckers removed, and to obtain big flower heads lateral buds surrounding the main head should be removed when about the size of a hen's egg.

The main objection of many home gardeners to globe artichokes is the large amount of space they occupy in relation to their yield, but they are rather ornamental and a few plants would help to provide variety in gardens having the space.

## Onions

Where main-crop onions are sown in spring, seed is usually sown in September or October as soon as ground temperatures are high enough for good growth. Seed should be sown as advised in last month's "Journal".

Established plants should be kept weed free, as they are soon checked if they have to compete with weeds.

## Substitutes for Onions

**Shallots:** Home gardeners who have difficulty in growing onions should try shallots, as the flavour of most varieties of shallots is indistinguishable from that of most onions and the yield of good varieties is high.

Shallots can readily be grown from cloves or off-shoots of the main bulb and as no careful nurture of seedlings is needed, their culture is comparatively simple. September is rather late for planting out shallots in many districts, as most bulbs, unless kept in cool storage conditions, will be too far advanced in growth to have been kept out of the ground.

Shallot bulbs should be graded to size and planted 8in. apart in rows 12in. apart. Each bulb should be pressed firmly just sufficiently far into the soil to keep it in position. Culture and soil requirements are similar to those of the onion.

The following may also be used as substitutes for onions, but because of their small size mainly for flavouring:—

**Chives:** These are very useful as a mild substitute for onions in salads and soups. They are propagated by division and plants are usually divided every 4 years. They should be set out 12in. apart and cut regularly in succession to ensure a supply of the young leaves for which they are grown.

**Ciboul, Welsh, or everlasting onion:** This does not form a bulb. The immature sprouts (cibouls) are used as "spring onions". They develop early in the year. There are two varieties, red and white, and both are very hardy, but because of their strong flavour are inferior to spring onions. The ciboul is a perennial, but can be sown annually similarly to onions.

**Egyptian or tree onion:** This type develops a large bulb from which it sends up one or more seed stalks on the top and sometimes on side branches of which are developed clusters of bulbils a little smaller than those produced by the potato onion and about the size of small marbles. They are used for flavouring and pickling. This vegetable is sometimes confused with the rocambole, but is distinguished from the true rocambole by its tubular leaves. There are two forms of tree onion, one producing aerial bulblets only and the other aerial and underground bulblets. The base bulb of the form producing only aerial bulbs may be grown in the normal way the first year, and if pinched back the second year, can be induced to grow quite large, though flavour is usually strong and texture rather coarse. The large bulbs do not keep well; culture is similar to that of shallots, except that the bulbs should be planted 3in. deep.

**Potato onion:** The potato onion (underground onion or multiplier)

[*Green and Hahn*
Seedlings should be thinned early.

[*Sparrow*
Shallots can readily be grown from cloves or off-shoots of the main bulb, and the yield of a good variety is high.

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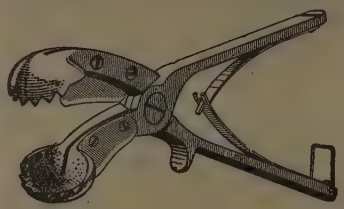

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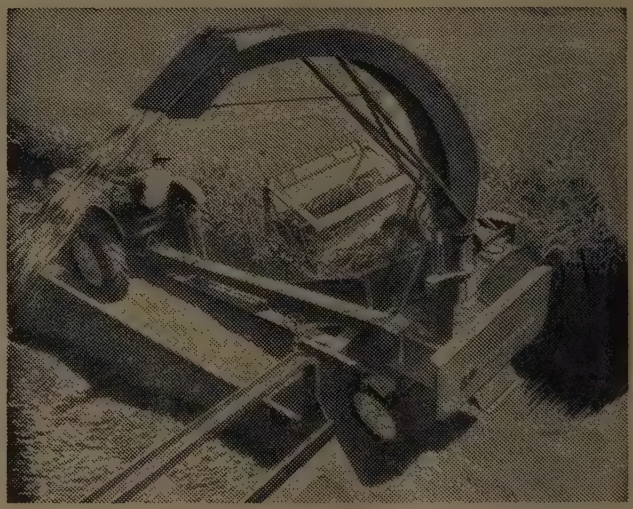

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[*Sparrow*

Upturned cases with the bottoms replaced with sheets of glass are useful for protecting tender plants.

forms a cluster of small bulbs or offsets after it has developed leaves. They are formed just under the surface and are of mild and pleasant flavour. Culture is similar to that of the shallot, but it is advisable to plant earlier.

**Rocambole:** Rocambole is sometimes called rock onion. Its treatment and culinary uses are similar to those of garlic, the culture of which was described in the June "Journal", though the flavour is milder.

## Parsley

To make sure of a good supply of parsley it may be necessary to sow seed twice a year, in spring and again in autumn. Parsley is a biennial, that is, it goes to seed the second year.

Parsley needs a rich, moist, well-drained soil, and fertiliser should be dug in before sowing as advised for other long-standing crops. Blood and bone at about 2oz. to 3oz. per square yard usually gives good results.

Seed can be sown in rows or broadcast on a small plot, but for best results plants should be spaced about a foot apart when large enough to handle. They make quite a good edging and do well in cool, moist soil in the open or semi-shade.

## Parsnips

A small early sowing of parsnips may now be made. A moderately rich soil containing well-rotted organic manure which was applied to a previous crop is best.

Because of its rather sweet flavour, which for vegetables is not altogether in accord with modern tastes, the parsnip is usually relegated to winter use. In most southern districts the main crop is sown in October; in northern districts November and December sowings are preferred.

The soil should be deeply dug and trenching is advisable on most soils if long roots are desired. The seed should be sown ¼in. to ½in. deep in rows 15in. apart and the plants thinned to 4in. to 8in. apart as soon as they are established. Where large roots are desired spacing should be liberal. To reduce thinning groups of four or five seeds can be sown together at intervals and later all but the strongest plant removed. Parsnip seed has a very low germinating capacity (even that of 1-year-old seed is only about 65 per cent.).

A few radish or turnip seeds sown between each group of parsnip seeds should germinate quickly and not only will mark the positions of rows, but will provide a quick-maturing crop that may be harvested before the parsnips require the intervening space.

Hollow Crown is a good variety for sowing now.

## Potatoes

Potatoes are one of the most generally planted vegetable crops in home gardens. Practically every home gardener grows them, as even where space is at a premium it is usually possible to grow at least one row of early potatoes. An early planting can be made as advised in last month's "Journal", though frost danger will not be past in most districts for some time and the plants will need earthing up or to be given other protection against frost.

## Salad Vegetables

Because most salad vegetables are usually eaten raw, they are almost without exception very good sources of vitamins. In the well-planned garden an adequate supply should be available for as long a period each year as the weather permits. The list of plants used in salads includes beetroot, celery, chicory, chives, cress, cucumber, endive, lettuces, mustard, nasturtium, onions, peas, shallots, radishes, and tomatoes.

## Lettuces, Peas, Radishes, Turnips, and Spring Onions

Successional sowings of lettuces, peas, radishes, turnips, and spring onions may be made. These vegetables remain in the best condition for only a limited time and should be used when young and fresh. A well-drained, deeply cultivated soil rich in humus is necessary, as quick, vigorous growth is essential for crisp, succulent produce. Seed of radishes, spring onions, turnips, and lettuces should be sown thinly ¼in. to ½in. deep in rows 12in. apart.

When well through the ground lettuces can be thinned to 8in. to 12in. apart and turnips to 3in. to 4in. apart. Alternatively lettuce may be sown in boxes in a frame and planted out when 2in. to 3in. high. Peas should

[*Green and Hahn*

Half-grown or three-quarter-grown spring cabbages usually benefit from a topdressing with nitrogenous fertiliser.

be sown as advised in last month's "Journal".

### Silver Beet and Spinach Beet

Silver beet and spinach beet do well in conditions which suit lettuce. The soil should be well drained and rich in organic manure and cultivation should be deep and thorough. Seed can be sown now where the soil is in good condition in rows 15in. apart and the young plants later thinned to about 8in. apart in the rows. Good varieties of silver beet are Lucullus and Dark Green Broad Ribbed and of spinach beet, Perpetual Spinach Beet.

### Tomatoes under Glass

Unheated tomato glasshouses are planted according to district from August to early October. Soil preparation should be started in good time. Tomatoes rarely succeed if grown in the same soil for 2 years in succession, unless the soil is disinfected with substances such as formalin or chloropicrin.

If the tomato house is very small, the soil can be taken out and renewed with good garden soil that has not recently grown potatoes or tomatoes. Soil on which grass has been growing is best. Alternatively results are usually satisfactory if a green crop has been growing on it. Soil that has been down in grass or green crops for a year, or preferably 2 years in succession, is usually free from the principal diseases affecting tomatoes and usually is in good physical condition, that is, drainage and aeration in it are good for that type of soil.

Formalin is usually the most satisfactory substance for the home gardener to disinfect tomato glasshouse soil with. The usual method is to have the soil in fine, friable condition—not wet, but not too dry—and to begin at one end of the house to dig it over, soaking along the line of digging after each successive spit or line of spits has been turned.

The formalin should be diluted at the rate of 1 gallon to 49 gallons of water and the 50 gallons of solution applied to each 10 to 15 sq. yds.' of ground surface according to the severity of diseases. For instance, where only minor root rots were troublesome or no disease was noticeable the area covered could be about 15 sq. yds. or perhaps a little more. Where serious disease, such as verticillium wilt, has occurred the measured amount of diluted formalin should be applied to 10 sq. yds or less.

Soil temperatures of 60 degrees F. or higher are recommended, as temperatures must be high enough to make the formalin become volatile and so disseminate it.

After the formalin has been applied the soil surface should be sprayed with water to form a seal and preferably covered with wet sacks. It should then be left with the house closed for about 14 days, when the ventilators can be opened and the soil forked over to assist the dispersal of the fumes, which are toxic to plants.

Planting can begin as soon as all fumes have been dissipated from the soil and base fertilisers have been dug in. Dispersal of the fumes is likely to be delayed by low temperatures and wet, heavy soils and speeded by working of the soil and high soil temperatures.

Chloropicrin or tear gas is not generally recommended for use by home gardeners, as a gas mask should be worn by anyone using it and an injector gun is advisable for satisfactory application.

# Horticultural Instructors Help Growers Toward More Efficient Production

FOR many years orchardists looked to Orchard Instructors of the Department of Agriculture for advice on the orchard manurial programme, pruning methods, disease identification and control, and the packing of fruit. Later a number of Vegetable Instructors were appointed to provide a similar service for commercial gardeners. These Instructors were usually men with considerable practical experience.

At a time when only limited research was done and procedures did not vary greatly these officers carried out fine work among fruit growers, in particular when commercial fruit growing was being established.

Today the scientific and mechanical advances affecting fruit and vegetable growing are so rapid and extensive and the problems so complex that only instructors with some scientific training are in a position to assess adequately those problems and interpret the findings of research workers.

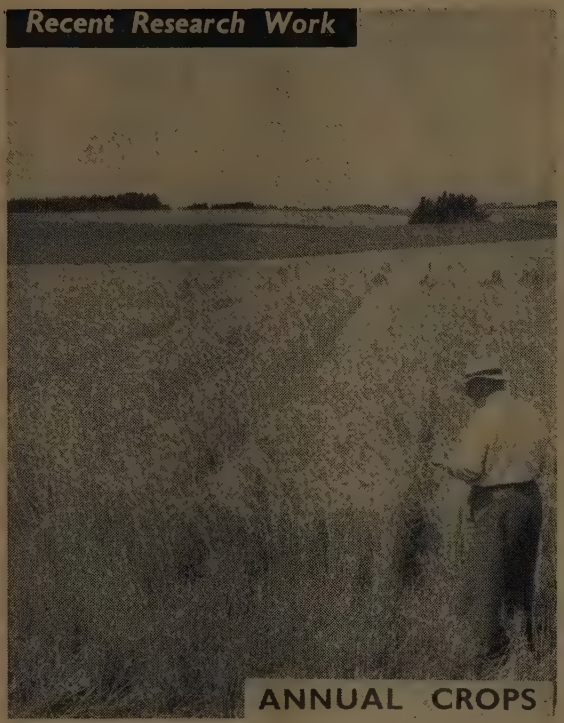
In recent years the policy of the Department has therefore been not to have separate Orchard and Vegetable Instructors but Horticultural Instructors with scientific training allied to field experience. Many problems are common to producers of various crops, and Instructors therefore do not necessarily confine their activities to any one branch of production, though in the larger centres some Instructors devote most of their time to orchard work and others to vegetable work.

An important part of Horticultural Instructors' work lies in the scientific assessment of growers' problems and in the extending of the findings of research stations to district problems by experimental work in the field. In this way Instructors provide a vital link between the grower and the research worker.

The duties of a Horticultural Instructor can be very interesting and satisfying and of the greatest practical advantage to producers in their efforts for more efficient production. Instructors require a good knowledge of horticulture allied with scientific training and are well rewarded, salaries for experienced, well-qualified Instructors rising to over £1000 a year.

Qualifications required for this work are a university degree in horticulture, agriculture, or science, together with practical experience in some branch of horticulture, or a diploma from the Royal New Zealand Institute of Horticulture — N.D.H.(N.Z.) or N.D.F.C (N.Z.) — or from Massey or Canterbury Agricultural College—Dip. Hort.

Anyone interested in a career as a Horticultural Instructor should write for further information to the Director, Horticulture Division, Department of Agriculture, P.O. Box 1500, Wellington.



# ANNUAL CROPS

LAST season the Extension Division conducted 503 trials with annual crops which were mainly concerned with testing the value of new varieties and strains and with crop fertiliser requirements.

**FERTILISER TRIALS WITH WHEAT**

THE long-term wheat manurial project entered its fourth year in the 1955-56 season. The fertiliser treatments are superphosphate drilled at different rates (1cwt. and 2cwt. per acre) and sulphate of ammonia (1cwt. per acre), which is used in two ways—either drilled with the seed or topdressed on to the wheat in spring.

A feature of these trials is that they are on co-operating farmers' properties which were selected as wheat-growing farms on different soil types; a trial is grown on each property each year and in a paddock which has been sown to wheat in accordance with the farmer's normal rotational practice. When continuous records have been obtained for a 5-year period the results will be examined to assess not merely the fertiliser responses obtained but also the effect of factors such as soil type, method of crop rotation, and previous manurial history.

Though the project is not yet complete, it is possible to review the findings of 3 years of trials; they must, however, be regarded as preliminary results only. There is an indication that if wheat is sown after more than 1 year of cropping immediately previously, there is a likelihood of the occurrence of responses to both superphosphate and sulphate of ammonia.

There has so far been no clear evidence of soil types affecting superphosphate results, but differing results have been obtained with the methods of applying sulphate of ammonia on the downs soils. On the downs soils where the wheat follows not more than 1 year of crop after grass it appears preferable to drill sulphate of ammonia rather than to topdress it in spring, for the former method has given better yields. No such difference occurs where wheat follows more than 1 year of crops on the downs soils or under any circumstance on the plains soils. A further useful fact which has emerged is that germination counts, which are regularly made in these trials, reveal that the drilling with the seed of either superphosphate or sulphate of ammonia at the rates used has not affected germination.

**FERTILISER TRIALS WITH POTATOES**

Another long-term manurial project is being undertaken with potatoes on lines similar to that described above for wheat. The fertilisers used are superphosphate, sulphate of ammonia, and muriate of potash, each applied at several rates and in all the possible combinations. The season 1954-55 was the third year of the project. In the 3 years of results so far available superphosphate has been the fertiliser having most influence on yields. In 23 trials over half have given significant yield responses to superphosphate, and with the type of trial possible for this project differences due to treatments have to be about 10 per cent. to achieve statistical significance. Thus a statistically significant difference is a substantial difference in terms of crop yields.

In most of the responses obtained with superphosphate there have been only a few cases where 6cwt. per acre of the fertiliser produced better results than 3cwt. In about one-quarter of the trials yield responses were obtained through use of sulphate of ammonia. On only two occasions did 2cwt. of this fertiliser give better results than 1cwt. For 2 years in succession in one trial sulphate of ammonia was effective only if it were used in combination with superphosphate; used alone it depressed yields. Potash has had little effect in the trials so far. Two isolated significant responses have been obtained—one was to 2cwt. per acre and the other to 1cwt.—but no consistent trends have occurred.

**FODDER BEET**

As there is some interest in fodder beet, particularly as a feed for pigs, a series of trials comparing varieties was begun in 1953-54 and continued in 1954-55. Varieties which could be obtained in normal commercial circles were used together with sugar beet and mangels. The trials have demonstrated that the fodder beets are intermediate in characteristics between sugar beet on the one extreme and mangels on the other.

Sugar beet has a root almost completely embedded in the soil, making it difficult to pull by hand, but the root has a high dry-matter percentage. The greater portion of the mangel bulb sits on top of the ground, with only a minor portion in the soil. It is consequently easy to pull; but the dry-matter percentage is low, less than half that of sugar beet.

The fodder beets possess intermediate characteristics, but to various degrees depending on variety. Two varieties tested, for example, Hinderupgaard and Hunsballe, appeared similar to sugar beet, but with rather more of the bulb protruding, were not so hard to pull, and their dry-matter percentages were somewhat lower. Pajbjerg Rex was a variety with a lower dry-matter percentage than the previous pair, grew with about a third of its root protruding, and was correspondingly easier to pull. Korsroe, Yellow Daeno, and Red Otofte, though different in appearance, formed another group characterised by up to half of the root above soil surface, were very easy to pull, and had a still lower dry-matter percentage.

This last group, though relatively low in dry-matter percentage of roots compared with sugar beet, were much higher in that respect than mangels. The yield figures obtained indicate that though sugar beet was usually outyielded by some of the fodder beets in weight of roots, its relatively higher dry-matter percentage combined with reasonably good root yield generally resulted in its producing the greatest amount of dry matter per acre. However, the variety of sugar beet used was a stock feed variety specially selected for that purpose at the Crop Research Division of the Department of Scientific and Industrial Research some years ago.

—*K. COTTIER*

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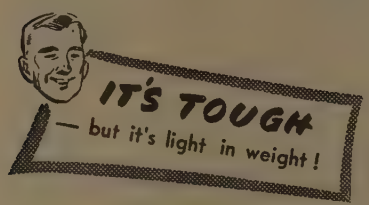


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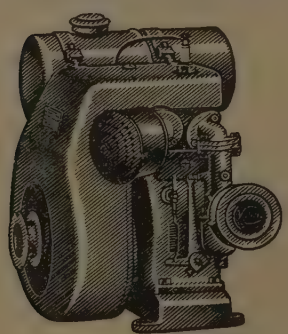

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# Successful Rearing of Household Chicks

By J. H. JONES,
Poultry Instructor, Department of Agriculture, Oamaru

**EVERY year at this time the problem of how to rear chicks from day old to maturity arises. Household poultry keepers requiring only a few pullets are better advised to purchase these at 6 to 8 weeks of age, but if a larger flock is needed, the rearing of pullets from day old can give much pleasure and satisfaction.**

SUCCESSFUL rearing depends largely on the provision of a favourable environment. Indeed the entire cycle of poultry keeping from the egg back to the egg is largely a matter of environment, though it is not always regarded so.

Several lessons can be learnt from a mother hen, the most important being the advantage of the small unit and the necessity for heat and close attention during the early stages. If chicks are given adequate warmth to run to when they require it and reasonable protection from bad weather, the more they can be exposed to open air conditions the better.

Fresh air never kills a chick and exposure to it is definitely beneficial, since it acts as a stimulant, encourages exercise, and improves the general physical condition of the youngsters, which results in more vigorous growth, more food consumed, and a greater resistance to disease.

Though fresh air is beneficial to chicks, cold draughts must always be avoided, as draughty conditions often cause the chicks to huddle together for warmth and they thus become overheated. A prime cause of poor rearing and heavy losses in chicks is overheating, which no birds can tolerate. One of the main reasons for a hen's making such a good job of rearing her brood is that under Nature's laws she simply cannot overheat her chicks.

Whether chicks are being reared intensively or extensively, the brooder should be regarded as doing the duty of the hen. It has to furnish them with the warmth to which they may run when they feel chilly and a place where they can sleep in comfort and under healthy conditions. No attempt should be made to keep the chicks in a warm atmosphere when they are outside the area of the brooder itself.

Chicks should not be confined to the warmth except for the first few days and even then they should not be too closely confined. As soon as they know their way about they should be given reasonable liberty to get the benefit of the fresh air.

## Size of Unit

Units of up to 100 chicks will be found to be most suitable for the household poultry keeper. The smaller the unit the better is the chick. Large batches of chicks of from 200 to 400 require more attention and management and are more in the commercial poultry producer's sphere.

Brooders should be prepared and running at least 2 days before the arrival of the chicks, and last-minute adjustments can be avoided if conditions are suitable for the chicks' reception.

The experienced poultry farmer will be able to judge for himself whether the temperature is correct, but beginners should use a thermometer before chicks are placed in a brooder. If a canopy type of brooder is being used, the temperature midway between the heater and the edge of the canopy should be about 90 degrees F., and if an infra-red type of brooder is being used, great care must be taken to ensure that the lamp is suspended above the chicks at the height recommended by the makers.

## Advantages of Infra-red Brooders

Many household poultry keepers looking for a relatively safe, simple, and easily managed type of brooder would be well advised to give some thought to infra-red appliances.

These have been on the market for some years now and have proved their worth. They are certainly at a disadvantage if there are power cuts, but if the power supply is fairly sure, they have much to commend them.

Two main types of infra-red ray lamps are available. One is the bright infra-red ray lamp, which is of 250 watts and which gives out both light and heat, and the other is the dull emitter infra-red ray, which radiates only heat and which can be bought in sizes ranging from 180 watts to 700 watts to accommodate varying sized batches of chicks.

Infra-red lamps of either type make the brooding of small units of chicks as simple as possible. There are no thermostats to go wrong, no thermometer to break, little danger of fire, and the chicks can be observed at all times. The experiences of many users suggest that the bright ray type appears suitable only for rearing small numbers of chicks, as the continuous bright light never allows the chicks to rest satisfactorily and can be conducive to toe and tail pecking. Many poultry producers use the bright emitter system, but the bulk of the large commercial farmers using the infra-red lamp method rely on the dull emitter system to rear their chicks.

The usual method of using these lamps is to suspend them by a light chain from the roof of the brooder house at a distance varying from 14in. to 20in. from the litter, depending on climatic conditions and the age of the chicks. The floor must be well littered, preferably with chaff to a depth of at least 4in., and in the first 10 to 15 days, depending on weather, the chicks live inside a surround of thick cardboard or hardboard approximately 18in. high and 4ft. in diameter which prevents them from straying away from the source of heat and getting into a draught.

To ensure that the lamp is the correct height and the chicks are getting sufficient heat it is necessary, as with the canopy brooder, to visit the brooder house last thing at night, when the chickens should be lying in a silent ring with a hole in the centre of them about the size of the reflector.

The ventilation of the infra-red system of brooding is well-nigh perfect and the chicks' behaviour can be observed at all times.

However, no matter how elaborate the brooding equipment may be, it will fail unless the person working it is keen on the job and unless good stock are obtained and no errors are allowed to occur in general management. Choosing a simple and efficient brooding system can go a long way toward ensuring fewer troubles, less worry, and a successful rearing season.

The electric infra-red lamp is an easily managed type of brooder and is relatively safe and simple.

# Care of Livestock during September

Contributed by the Animal Research Division

FOR the first month or 6 weeks of life the lamb depends almost entirely on its mother's milk. Ewes are capable of producing more milk than a single lamb can drink in the early part of lactation. Twins, on the other hand, can soon drink all the milk which the ewe can produce. For this reason ewes with twin lambs should be drafted off and grazed together on good paddocks. Separation is most easily done immediately after lambing.

**CARE OF EWES WITH TWIN LAMBS**

Over 9 years at Ruakura Animal Research Station well-reared heifers have out-produced their poorly reared mates by an average of 15lb. of butterfat in the first lactation when both were well fed after calving. Frequent changes to good, clean pasture are essential if calves are to be successfully reared. This rotational grazing eliminates deaths in winter and the need for drenching against worms and produces yearlings 100lb. heavier than those kept in the one paddock for weeks at a time. Further information on correct rearing of dairy stock is contained in Department of Agriculture Bulletin No. 228, "Good Rearing of Dairy Stock". This is available free from offices of the Department.

**ROTATIONAL GRAZING OF CALVES**

On farms where scabby mouth occurs each new crop of lambs should be vaccinated; this is most conveniently done at marking. If lambs are not protected, they are liable to suffer a severe check, as the disease makes eating very painful. The vaccine gives very good protection if properly used. Care is necessary to keep the needle prong clear of grease; if it becomes blocked, no vaccine is applied and lambs may still be susceptible. Ewes which have not previously been exposed to the disease should be vaccinated at the same time as their lambs.

**VACCINATION AGAINST SCABBY MOUTH**

Mastitis is usually most prevalent in spring. Milk from all quarters should be examined carefully each day in a strip cup. If there is any abnormality, treat the quarter without delay, using three tubes of penicillin cerate at 24-hour intervals. Prompt treatment at this time of the year will greatly reduce loss in production from light or dry quarters.

**MASTITIS**

To prevent coccidiosis in chickens it is necessary to keep them growing steadily. Any check is dangerous. Cleanliness is very important, as the disease spreads through the soiling of food by droppings. If an outbreak occurs, sulphamezathine or sulphaquinoxaline should be used in the drinking water. Full particulars of dosage may be obtained from Department of Agriculture Poultry Instructors.

**COCCIDIOSIS IN POULTRY**

The work carried out on X chick disease during the last 2 years has shown it to be a form of vitamin E deficiency, possibly arising from the feeding of certain batches of wheat. Outbreaks of X chick disease have been confined so far to the South Island. Poultry farmers in the areas affected in previous years are advised to add 5 per cent. of wheat germ meal to the chick mash as a precautionary measure. An article describing the results of the investigation carried out on this disease appeared in the September 1953 issue of the "Journal".

**X CHICK DISEASE**

Autumn-saved pasture is almost equal to high-quality spring pasture as a milk-producing fodder. It should, therefore, be rationed to the milking cows to make it last until the spring feed comes away and hardens up. An electric fence is essential for efficient utilisation, enabling it to be grazed in small breaks. Unless sufficient reserves of this pasture are available for full feeding, the balance should be made up with silage. Enough hay should be retained to balance the lush spring growth.

**FEEDING THE MILKING HERD**

When the autumn-saved pasture is finished the herd should be rotated round the farm. Paddocks should be small enough to maintain a concentration of 20 to 30 cows per acre. If necessary, subdivide larger paddocks with the electric fence. Aim at grazing pasture when it is 4in. to 6in. high, as it is then at its most nutritious stage. Do not keep cows in any paddock for more than 1 or 2 days. If necessary, clean up after them with dry stock.

Late-farrowed spring litters should receive special attention, since they will be approaching weaning age. Creep feeding is the secret of the heavy weaner and best results will be obtained by having a supply of meal and milk always before the litter. Weaned pigs must be well fed and, if meal has been used before weaning, its use should be continued for at least a fortnight to avoid an after-weaning check. The meal ration can be reduced as the skimmed milk supply increases. It is preferable to feed meal as up to half the daily rations of weaners and give the milk saved to the store pigs rather than to feed meal to the older pigs at this stage. After weaning, sows should receive sufficient milk and meal to enable them to regain the weight lost during previous suckling. They should be hand mated, and once safely in pig may be allowed to subsist on good pasture.

**CARE OF PIGS**

## Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during June and for the 11 months ended 30 June 1956, with comparative figures for the same month and 11 months of 1954-55, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

**BUTTER**

| Period | Creamery (tons) | Whey (tons) | Total (tons) | Percentage Inc. or dec. |
|---|---|---|---|---|
| June 1956 .. .. .. | 526 | 19 | 545 | — |
| June 1955 .. .. .. | 378 | 11 | 389 | — |
| Increase or decrease .. | +148 | +8 | +156 | +40.103 |
| 11 months ended 30/6/56 | 159,881 | 2,955 | 162,836 | — |
| 11 months ended 30/6/55 | 147,067 | 2,991 | 150,058 | — |
| Increase or decrease .. | +12,814 | —36 | +12,778 | +8.515 |

Butter in store at 30 June 1956 was 24,780 tons

**CHEESE**

| Period | White (tons) | Coloured (tons) | Total (tons) | Percentage Inc. or dec. |
|---|---|---|---|---|
| June 1956 .. .. .. | 1,478 | — | 1,478 | — |
| June 1955 .. .. .. | 1,021 | — | 1,021 | — |
| Increase or decrease .. | +457 | — | +457 | +44.760 |
| 11 months ended 30/6/56 | 79,396 | 12,702 | 92,098 | — |
| 11 months ended 30/6/55 | 77,309 | 20,556 | 97,865 | — |
| Increase or decrease .. | +2,087 | —7,854 | —5,767 | —5.891 |

Cheese in store at 30 June 1956 was 21,339 tons

If these figures are converted into butterfat equivalent, there is an increase of 5.243 per cent. in butterfat graded for the 11 months as compared with the corresponding period of the preceding season. The above figures refer only to butter and cheese graded for export, and owing to diversions which may take place from time to time they are not necessarily a true indication of production trends.

# Spring Pasture Management and Land Preparation for Spring-sown Fodder Crops

## Seasonal Notes by the Extension Division

THE chief grazing problem on both sheep and dairy farms in spring and early summer is keeping the pasture leafy and nutritious when pasture production is at its maximum and the rate of growth is well above the requirements of stock that can be wintered.

**DAIRY FARMS**

ON dairy farms good pasture management is best achieved by rotational grazing. In early spring while growth is still backward it may be necessary to rotate the milking herd round the farm with a daily change of paddocks. As the season progresses and more and more feed is produced in each paddock the cows are grazed 2 or more days in each and only a portion of the farm is used for grazing, the rest being closed for hay or silage. These crops should be harvested in November and early December to avoid damage to the sward and to secure high-quality supplementary feed and a good aftermath. When the closed paddocks have been cut the whole farm is in good order to produce leafy, nutritious feed into summer. Once grass has been allowed to produce seed heads it is much lower in feeding value than leafy grass and the grazed paddocks should not be allowed to become rank. They should be topped with the mower to keep them controlled and harrowed to spread stock droppings. Pastures should be topped in rotation after grazing and if the quantity of toppings is small, the material will be readily cleaned up by young stock. If there is a large quantity of material, it may be best used as hay or if a forage harvester is available, it is possible for it to be made into silage.

**SHEEP FARMS**

Owing to lambing in early spring and the increasing demand for feed by the lambs as the season progresses the sheep farmer has not generally the same surplus as the dairy farmer to deal with. Normally, however, the sheep carried cannot cope with the flush of feed and the mower and cattle must be used to handle surplus growth. On fat lamb farms pastures can be kept producing leafy feed well into summer by concentrating the ewes and lambs on fewer paddocks and closing the remainder for hay, silage, or seed production. Where pasture seeds can be harvested control can be gained by closing some paddocks for seed in late October and early November and confining the stock to an area where they can cope with the feed. Where seed production is not possible paddocks should be closed for hay or silage and saved for winter feed for sheep and cattle, such cattle also helping in spring and early summer feed control. The aftermath of paddocks cut early is a valuable lamb feed or can be used for cattle fattening in summer. Similar management can be applied on hill country farms, but cattle are used instead of the mower to clean up surplus growth. As soon as the growth starts to get away from the stock paddocks which will benefit from a spell are selected and the stock removed to adjoining paddocks where they help to keep control of the feed. In addition to the grazed paddocks being kept in good order by the heavier stocking the clover in the spelled paddocks is given an opportunity to reseed. As soon as the rate of growth falls off the closed paddocks are brought back into good grazing condition for the ewes and lambs by concentrating the cattle on them.

*—J. A. GRAHAM*

* * *

**ROTATE CALVES AHEAD OF DAIRY COWS**

CALVES are the foundation of the herd and well-grown calves become well-developed heifers with a higher production than poorly grown animals. The starting point is now when calves begin grazing. At this stage they are fastidious selectors of pasture and will not eat overmature grass or graze well after other stock. Calves should then be rotated ahead of the dairy herd to give them fresh, unsoiled pasture. They should not be confined to a calf paddock until weaned and then set stocked on a paddock of rough feed at the back of the farm. They should move ahead of the milking herd to allow the paddock to be grazed by the calves and then spelled for a few days to freshen before the herd comes on to it. In this manner calves are encouraged to eat their maximum and build up vigour and resistance to worm infestation. Calves are quickly trained to move from paddock to paddock and they should be retained in the calf paddock adjoining the milking shed for the first few weeks only and where early weaning is carried out they must be trained before milk feeding is finished. The calves' need for roughage should be satisfied with good hay fed in a rack, not on the ground, and they should have access to clean water at all times. In a dry autumn when pasture becomes scarce silage or crops should be fed to the calves as soon as they are fed to the dairy herd.

*—C. E. BALLINGER*

* * *

**LAND PREPARATION FOR SPRING-SOWN FODDER CROPS IN SOUTH ISLAND**

SPRING-SOWN root and fodder crops are swedes, turnips, chou moellier, kale, and rape. Land being prepared for swedes is usually ploughed in the autumn or early winter. After a winter fallow the ground is disced and harrowed several times to form a fine tilth. On the more friable land the cultivator or hustler is used in preference to discs, which are more useful on the heavier clay country. The object is to work the ground to produce a compact, firm seed-bed throughout the turned furrow. During the latter stages of cultivation lime may be applied and worked in. Finally the ground is rolled and the crop sown in 7in. or 14in. flat drills on the lighter, drier land or in 24in. ridges on the heavier land in the wetter districts where weeds are troublesome and the crop can be intercultivated. The brown beetle is usually in flight during November and December according to the district and the land should be cultivated to enable the crop to be sown early so that it is in the rough-leafed stage before the main flight of the beetle, or the crop should be sown later after the main flight. If fly damage is severe and the area has to be resown, soft turnips can be sown, as they are quicker maturing. Soft turnips can be sown early in September-October for summer feed or with grass in December for late autumn and early winter feed. Cultivation and sowing are similar to those for swedes. Where a second crop of turnips is required hard, yellow-fleshed turnips are usually grown, as they are somewhat resistant to club root and produce good crops. Chou moellier and thousand-headed kale usually follow swedes or they may be sown out of lea ground. Cultivation is similar to that for swedes. For crops following swedes the ground is disced and harrowed several times and clod crushed if necessary in October. The crop is sown on a rolled surface in early November, being either flat drilled or sown with a ridger. Rape is drilled or sown with a ridger or broadcast or drilled in with grass. It usually follows swedes, turnips, or chou moellier and is sown from November to January, according to when it is required for feeding. On light land it may be ready for feeding in 6 to 8 weeks, but in southern and higher-rainfall districts it usually requires 12 to 14 weeks to reach maturity. The fine, firm seed-bed required is obtained by early ploughing and working with discs or cultivator, followed by a series of harrowings and rollings to germinate and kill weed seeds.

*—T. G. SEWELL*

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# Soil Management in Vineyards

By F. BERRY-SMITH,
Viticulturist, Department of Agriculture, Auckland

THE maintenance of soil fertility in the vineyard is essential to profitable grape culture. Though all would agree, no doubt, with this axiomatic statement, most grape growers have different ideas about soil management, ranging from almost guesswork to a thoughtful assessment of the soil's requirements. Soil management includes cultivation, cover cropping, application of fertilisers and manures, and soil amendments. Sometimes even the most diligent vignerons fail to maintain the fertility of their vineyards through basing their practices on false premises. A scientific knowledge of the properties of soils and their testing and requirements is the specialised province of the soil chemist, and his expert assistance is advisable and necessary in certain cases. However, the basic principles of sound soil management are simple enough and most rewarding if faithfully applied.

TO achieve soil fertility in the vineyard it is necessary to have a clear picture of the vines' nutritional requirements. Contrary to popular belief grape vines are light feeders. This may be expected, as the crop is mainly only sugar and water. Grapes are capable of growing successfully on soils too poor for most other agricultural crops. In the densely populated countries of Europe where grapes are grown they are planted mostly on the poorer land, while rich soils are reserved for intensive cultivation of other crops.

It has been calculated that the harvesting of a 6-ton crop of grapes off an acre of vineyard removes the main plant foods, nitrogen, phosphoric acid, and potash, in amounts equivalent to only about 1cwt. of sulphate of ammonia, ¼cwt. of superphosphate, and ½cwt. of sulphate of potash. A 6-ton yield of grapes per acre is a heavy crop.

## Application of Manures

Vine manuring experiments conducted overseas on a wide range of soil types have rarely given spectacular results. These investigations have mostly indicated that organic matter and total nitrogen content of the topsoil are the main criteria of fertility, and inorganic fertilisers may be applied to best advantage to encourage the growth of cover crops.

Increasing the organic matter in the soil in vineyards to any extent by applications of farmyard manures, prepared compost, fowl manure with litter, and the like, though desirable, is generally too costly.

In some special cases it pays to use organic manures, if the cost is reasonable, to effect rapid soil improvement.

In some old vineyards on clay soil at Henderson where the fertility was seriously depleted the vigour and cropping of the vines were greatly improved after several annual applications of fowl manure and accompanying litter applied at 3 to 4 tons per acre. This manure is best applied in autumn, this time of application giving it all winter to decompose and become available to the vines the following season. On hilly country where there is a danger of erosion such manures should be applied in autumn as a surface dressing. The weed growth encouraged will bind and hold the manure from scouring.

## Cover Crops

For economic reasons, however, the vigneron must necessarily depend mainly on the production of good cover crops for maintaining organic matter, so essential to fertility, in his vineyard soil. To this end fertilisers should be applied mainly for nourishing the cover crop and only indirectly the vines. This is the first principle of good soil management.

Above and below—A combined subsoiler and ridger used for improving drainage.

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## Importance of Organic Matter

Because of the importance placed on organic matter in relation to soil fertility its main functions in the soil are outlined here.

Organic matter is decomposed in the soil to form humus, in which state it plays an active role in three categories —mechanical or physical, biological, and chemical.

It acts mechanically as a soil conditioner, cementing soil particles together into stable aggregates or crumbs, giving body to a light soil and making a heavy soil more friable. In all cases humus improves aeration and water penetration and retention and assists drainage.

Its biological functions are particularly important, as it supports hosts of organisms in the soil whose work is favourable to fertility. These organisms include earthworms, fungi, and bacteria. The earthworm population in a fertile soil frequently reaches a million or more per acre. Their digestion of the soil and its expulsion as casts in and on top of the land play a useful part in conditioning the soil. Their tireless burrowing deep in the soil improves drainage and aeration, both necessary for healthy development of plant roots.

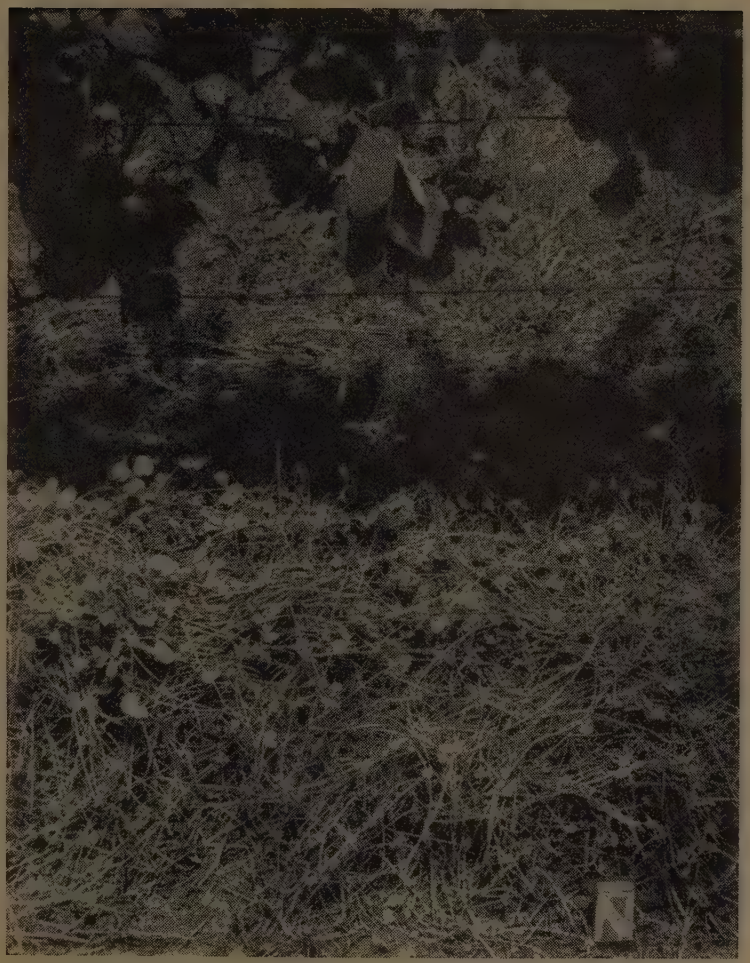
From decomposition of organic matter and humus by micro-organisms various organic acids are liberated which dissolve mineral nutrients and make them available to plants. Humus also increases the holding or base exchange capacity of soils, an expression for the ability of soils to absorb and hold reserves of plant foods which would otherwise be leached. Leaching may remove plant foods in the drainage water or wash them deep in the soil, out of reach of the feeder roots. On complete decomposition humus releases nitrogen and all other food elements present in the parent organic material from which it was formed.

A range of cover crops may be used to improve fertility in vineyard soils. In most cases a leguminous cover crop such as blue lupins or subterranean clover is most suitable. These are capable of enriching the soil with nitrogen taken from the atmosphere, a good crop contributing the equivalent of as much as 4cwt. to 5cwt. of sulphate of ammonia per acre. Such a cover crop will supply practically the whole of the vines' nitrogen requirements; additional application of nitrogenous manures could give trouble with defective setting, poor colouring, and possibly disease.

## Rate of Sowing of Cover Crops

The cover crops most commonly used in vineyards with sowing rates per acre are:—

| | lb. | | lb. |
|---|---|---|---|
| Blue lupins | 90 | Subterranean clover | 12 |
| Dun peas | 90 | Barley | 90 |
| Oats | 60 | Rye | 90 |
| Mustard | 6 | Rape | 6 |



A trial cover crop of Bacchus Marsh subterranean clover in a commercial vineyard at Henderson. The growth is cut away to give a cross-sectional view and show the depth and density of the clover.

Lupins, subterranean clover, and peas should be sown with 2cwt. of superphosphate. Cereals (rye, oats, barley) and other non-legumes should be sown with 1cwt. of sulphate of ammonia in addition to 2cwt. of superphosphate to promote a good stand. Of the cereals, rye gives the best yield on poor ground and is often the best to use when the growing of cover crops is beginning. Peas show seasonal variations in growth, but in a good year will outyield cereals and have an advantage in not requiring nitrogenous manures. A mixture of peas and cereals usually outyields either alone, and a suitable seeding rate is 1 bushel of cereal with ½ bushel of peas per acre. Mixtures should be sown with 2cwt. of superphosphate and ½cwt. of sulphate of ammonia.

A rather unusual mixture favourably reported on from overseas sources is a cereal crop undersown with red clover which is reputed to produce per acre about the same amount of organic matter and nitrogen as a 10-ton dressing of farmyard manure.

The grower may need to experiment to some extent to determine which cover crops do best on his land. If the soil is well supplied with nitrogen, which will show in the vigour and bright green colour of the vine foliage, it would be imprudent to introduce excess nitrogen with

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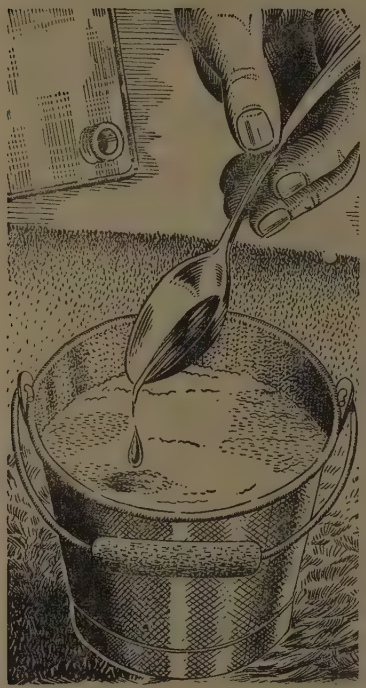

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legumes. Often a rotation of cover crops is best.

Early sowing, before the end of March for preference, is essential for best results. Late sowing when the ground and weather are cold gives a disappointing result.

Broadcasting the seed and covering it by harrowing have proved superior to drilling, which is inclined to place the seed too deep. Cover crops should be turned in not later than the middle of August to avoid nitrogen starvation of the vines at bud-burst. When a green crop is cultivated into the soil the intensified bacterial activity during decomposition draws on most of the available nitrogen. The impounded nitrogen is released when decomposition is advanced.

A rotary hoe is ideal for turning in cover crops, as it breaks the crop into small pieces which quickly rot down. Cover crops should not be turned in deeply, as this retards decomposition.

## Subterranean Clover

Subterranean clover has proved eminently successful as a cover crop for vineyards and orchards in many parts of Australia, where it has proved superior to other cover crops in many respects. Trials with subterranean clover in New Zealand appear promising and its more extensive use as a cover crop seems probable (see illustration on page 141).

There are several requirements to observe for the successful establishment of subterranean clover. In vineyards in South Australia an early-maturing strain of subterranean clover called Bacchus Marsh has excelled. Late-maturing strains of subterranean clover are entirely unsuitable. Good establishment has been secured with 5lb. of seed per acre. Seeding must be early, preferably not later than mid-March, to obtain the benefit of autumn rains.

A firm seed-bed is essential for successful germination, for which reason deep cultivation must be discontinued after mid-January. The seed should be sown with superphosphate at 2cwt. per acre. If the soil is deficient in lime, a preparatory dressing of about 3cwt. or more per acre is necessary. On no account should superphosphate and lime be mixed with the seed when it is being broadcast, as chemical action would occur, impairing the germination of the clover. The seed is simply broadcast on the land, no covering being necessary.

Clover is a failure on land with a deficiency of the trace element molybdenum. If there is such a deficiency or one is suspected, a molybdenum superphosphate mixture should be applied instead of ordinary superphosphate. Molybdenum is required in such minute quantities that further addition is not required for some years. This mixture, prepared ready for use, is obtainable from fertiliser merchants.

Another possible cause of failure may be the lack of suitable rhizobium bacteria in the soil. These bacteria, which live in nodules on the roots of the clover and fix atmospheric nitrogen, are indispensable. Cultures of rhizobium bacteria for inoculating the seed before it is sown are procurable.

Subterranean clover makes vigorous growth throughout winter, setting its seed and dying back sometime in November (see illustration below). It finishes its growth cycle at an opportune time before competing with the vines in the dry, summer period.

In many Australian orchards subterranean clover has been allowed to take command of the ground cover, eventually excluding all weeds. No cultivation is done and the clover is allowed to seed and regenerate from season to season. In time a thick mat of clover residues builds up, enriching the soil with humus and acting as a mulch in retarding loss of moisture from the soil by evaporation. At present it is too early to say whether this system in its entirety is suited to

A clover cover crop cut at ground level and folded back to show numerous seed burs. The seed matures in November.

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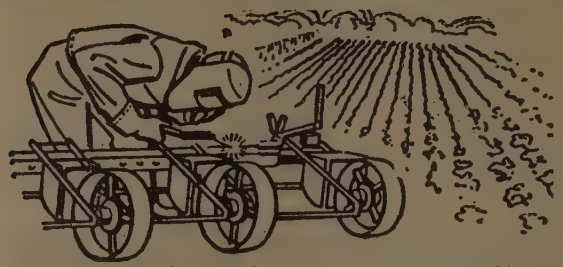

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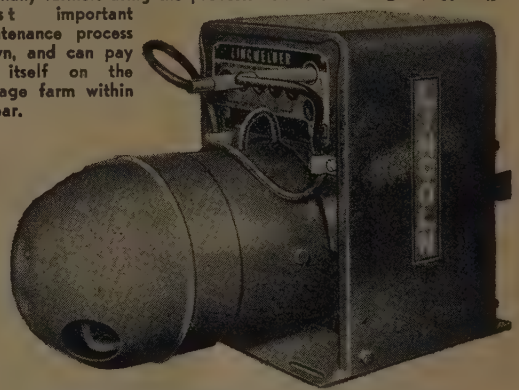

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vineyards. The lush ground cover provided by the clover is conducive to fungous disease because of the increased humidity and restricted ventilation under the vine trellises. Possibly the compromise of clearing under and alongside the trellises and leaving a strip of clover down the centre of the rows for maturing and seeding will prove most suitable.

## Alternative to Cover Crops

If for some reason it is not possible to sow a proper cover crop, an expedient alternative is to encourage volunteer weed growth by topdressing with 2cwt. of superphosphate and 1cwt. to 3cwt. of sulphate of ammonia.

Many growers sow cover crops only in alternate vine rows to leave a way clear for pruning. Where possible it is better to make a complete sowing and mow alternate rows to allow convenient entry for pruning.

## Additional Manuring

The 2cwt. of superphosphate per acre recommended for addition with the cover crop provides the annual requirements for phosphoric acid. To avoid any likelihood of a potash deficiency, which could occur in time, 1cwt. of sulphate of potash per acre may be added when the cover crop is turned under, thus making ample restitution for the amount removed by the crop each year.

When leguminous cover crops are grown sufficient nitrogen is usually imparted to the soil. With non-legumes the addition of 1cwt. of sulphate of ammonia usually meets full requirements. If additional nitrogenous fertiliser appears necessary, this may be added when the cover crop is turned under in August.

This provides for annual routine manuring. When, however, a vineyard is being established it is advisable to have a soil analysis, which may indicate the necessity of fairly heavy additions of certain fertilisers to correct initial deficiencies and build up reasonable reserves.

In most soils annual additions of lime are usually necessary to prevent the development of excess acidity. An annual addition of 3cwt. of lime usually meets requirements. On heavy clay soils, which are inclined to be acid, as much as 2 tons of lime per acre are beneficial when the land is first prepared for vines.

On certain land in New Zealand low in magnesium a deficiency of this element may occur unless dolomite lime or serpentine superphosphate is occasionally brought into the manurial programme.

Magnesium is an essential ingredient of chlorophyll, the green colouring matter of the leaves. Though not a major element like phosphoric acid, potash, and nitrogen, it is used by vines in quantities much greater than those required with trace elements, such as iron, manganese, boron, zinc, and copper.

Two vines which have grown from unrooted cuttings without soil. Left—In tap water alone. Right—In a hydroponic solution.

Magnesium deficiency shows up most noticeably on the older leaves in autumn. While the main veins remain green, the rest of a leaf develops a yellow mottling and the leaves fall prematurely.

A potassium deficiency can cause poor colouring of the berries and the leaves may have a yellowish mottled appearance with the tips and edges scorched. Spongy pruning wood is another symptom.

Typical of phosphorus deficiency are a general unthriftiness of the vine, early autumn colouring, and premature leaf fall.

Lack of nitrogen causes pallid foliage, stunted growth, and poor crops.

## Don't Over-manure

A common misconception among grape growers with manuring arises from a belief that if a little does good, a lot will do much better. Nothing could be further from the truth, as excess fertilisers can be quite harmful. The writer has seen a number of vineyards which have been almost killed by "kindness".

An excess of any plant food can be either toxic to plants or act to repress availability of other elements. High levels of available phosphoric acid, according to impressive evidence, repress the availability of a range of trace elements, including zinc. Both phosphate and potash accumulations can make magnesium unavailable. A lack of nitrogen can also aggravate a magnesium deficiency.

The action and reaction of plant food elements cannot be discussed at greater length here, but sufficient has been said to show the dangers of unbalancing the soil complex by incorrect use of fertilisers.

Lime, also basic slag which contains lime, can also be used to excess with unfortunate results. If the soil reaction becomes alkaline or nearly so from excess lime, the trace elements iron, manganese, boron, zinc, and copper become unavailable; molybdenum is the exception. A soil reaction of about pH 6.5 appears optimum for vines.

## Cultivation

Cultivation should be kept to a minimum necessary to curtail the competition of weeds with the vines.

Every cultivation does both good and harm to the soil. The good decreases and the harmful effects increase with the frequency of cultivation, reaching a point when only harm results.

Every cultivation causes loss of humus from the soil by oxidation. Good soil husbandry aims at the preservation of humus because of the vital role it plays in soil fertility. Continual cultivation to maintain vineyards in a fine seed-bed condition will inevitably damage the soil.

A soil depleted of its humus content loses its good mechanical condition and becomes powdery, loose, and dusty. After rains such soils become a quagmire and on drying out pan down in a hard, compact condition. A surface pan can form in this way even on light soils, making water and air penetration difficult.

With the exception of noxious varieties weeds should not be looked on as arch enemies to be destroyed at all times at any cost. Rather should they be considered in a more friendly light when they do not offend by appearing in too great numbers at the wrong time. All plants acting as a ground cover are soil builders and conditioners. It is better to have a fertile vineyard with a few weeds than an impoverished soil free of all weed growth. Some ground cover throughout the growing period of the vine can encourage useful predator insects and assist in biological control of insect pests.

What cultivation is considered necessary should never be too deep. Deep cultivation drives the roots into the cold, infertile subsoil, causing the vines to languish. Cultivation in autumn and early spring should not exceed 4in. near the vines. Farther away from the vines somewhat deeper cultivation can do no harm. During the growing season cultivation should be just deep enough to cut the weeds out and no more, to avoid injury to the vine feeder roots near the surface.

The rotary hoe and disc cultivators which have a pulverising action are most harmful to soil structure if used too frequently. For turning in cover crops and breaking up and burying prunings these implements are ideal. The breaking up of prunings into small pieces facilitates disintegration in the soil. Prunings make a useful contribution to the organic matter in the soil and turning in is preferable to burning, unless disease has been troublesome. Diseased wood in the vineyard could spread infection. Old vines may be invigorated by deep ploughing in late winter, severing the old roots and inducing the formation of a new root system. This root pruning should be done on one side only for a start, two seasons being allowed to pass before the operation is repeated on the other side. Subsoiling at this time is opportune and beneficial.

Of course, no cultivation should be done on soil when it is too wet, as the soil then dries out into hard lumps which are difficult to break down. Most good is done if the soil is turned when just the right degree of moisture is present.

## Drainage

Proper drainage of vineyard soils is essential for best results, as vines are fairly intolerant to waterlogged conditions. Sometimes the laying of field tiles provides the only satisfactory solution, but a vineyard site should be selected where there is reasonably good natural drainage to avoid the high cost of tiling.

A fairly general practice in vineyards to assist drainage over winter is to plough on to the vines on both sides of the row, leaving a fairly deep furrow down the centre. This is done in autumn. In this way soil is mounded around the vines and excess water runs away down the centres of the rows.

Correct placement of the vine rows in relation to the contours of the land facilitates surface drainage. With such orientation the rows make a herringbone pattern with a slight fall to a headland, down which the water escapes. Grassing down of the headland prevents scouring and soil erosion. If the soil is in a bad mechanical condition, no drainage scheme can be fully efficient.

Cover crops act as good dewatering agents, removing much surplus water, and their roots open up the soil and assist drainage.

Mole drainage has limited application and is not always successful. Unless extreme care is exercised in making mole drains, irregularities occur which form air locks and arrest the flow.

Useful results have been claimed on land with little natural fall by use of a subsoiling device fitted with a moulding attachment (see illustrations on page 139). Water can run down the furrow made by this equipment deep into the subsoil, where it usually finds a natural watercourse.

The furrow is said to prevent the narrow opening made by the subsoiler from closing up, as organic matter from the topsoil washes down and keeps the opening porous to water.

One of the main reasons why vines do not thrive in poorly drained soils is that root-destroying organisms, such a nematodes and certain bacteria, thrive in such conditions. Such soils are also cold and poorly aerated and unfavourable for good root development. The illustration on page 145 shows two vines which have grown from unrooted cuttings without soil. The one on the left was grown in tap water without added nutrients and the one on the right in a hydroponic solution. Neither the water nor the solution was changed at any time, but evaporation losses were replaced with tap water in both cases.

That these vines did so well under adverse conditions illustrates the hardiness of the species.

Sufficient air was dissolved for root growth, and as the vines were in a practically sterile medium, harmful, root-destroying organisms were absent. Growth, of course, did not equal that of similar cuttings grown under natural conditions in fertile soil.

All photographs by Sparrow.

## "N.Z. Census of Farm Production"

AS part of the FAO World Census of Agriculture held in 1950, in which New Zealand participated, a complete analysis of types of farming was carried out by a joint effort between the Statistics Department and the Department of Agriculture. Some results of this analysis were published in the "Journal" for August, September, October, November, and December 1952 and January 1953.

The Statistics Department has now completed a very thorough analysis of all the material, and the results have been published as a volume entitled "Final Report on the New Zealand Census of Farm Production 1949-50".

In addition to giving numerous tables covering items such as livestock, crops, land tenure, number and size of holdings, farm population, implements and machinery by farming types and in most cases by farming regions the report also contains a number of summary tables and a complete analysis of Maori holdings. There is in the report a wealth of information both for the research student and those engaged in the administration of agriculture.

—J.V.W.

**Government Printer. 11s. 6d.**

### Publication Received

"Annual Farming Digest and Agricultural Directory of Scotland" (1956 edition), Mearns Agricultural Publications, Majestic Buildings, 7-9 Union Row, Aberdeen. Price in Britain 10s. 6d.

# High Energy, High Efficiency Rations for Laying Poultry

THOUGH practical experience over the years has shown that laying birds will give reasonable results on a wide range of rations, the importance of feeding the most efficient ration available must not be lost sight of at any time. Feeding a layer represents at least 60 per cent. of the cost of producing eggs and for this reason alone efficiency in feeding is of significant importance in poultry husbandry. In this article F. C. Bobby, Superintendent, Poultry Industry, Department of Agriculture, Wellington, reviews some of the aspects of poultry feeding in New Zealand over recent years and refers to a recent trend in this aspect of poultry farming.

The good health of these growing pullets is the result of feeding high efficiency rations. Maximum egg production can be expected when the birds reach maturity.

OVER the last 10 to 15 years there have been some marked changes in the rations fed to laying birds in New Zealand. A part of these changes has been caused by the use of mashes produced because of advances made in the science of feeding, while other changes have been caused by war and post-war conditions.

The older established commercial poultry farmers will remember the days of wet mash and grain feeding, when the former consisted almost entirely of pollard, bran, and meat meal. Apparently satisfactory production and healthy stock resulted. Little or no thought was given to vitamins and the protein level of such a mash was low by today's standards. It is unlikely that such a mash would be satisfactory today owing mainly to the fact that the quality of pollard and bran for poultry feeding is now far lower than it was before the Second World War. The raising of the extraction rate of wheat in the manufacture of flour lowered appreciably the calorific value of pollard. Further reference to this matter will be made later.

Again there is little doubt that under certain circumstances during winter and dry summers laying birds did suffer from a shortage of vitamin A, though generally the common practice at that time of feeding large quantities of good green food protected stock from the worst handicaps of a vitamin A shortage. For laying stock there was little danger of a shortage of vitamin D, as most birds were either running outside or were housed in open-fronted houses, thus exposing the birds to an adequate amount of direct sunlight or bright light, which built up sufficient vitamin D in the birds.

## Effect of War

The war caused a change in the extraction rate of wheat in the manufacture of flour and a consequent lowering of the feeding value of pollard. It is perhaps fortunate that the war also caused a shortage of pollard and bran and the necessity to use less of these two meals and more ground coarse grains or wheat. In this way the depreciation in feeding value of pollard was offset by the higher calorific value or carbohydrate content of the ground grains which replaced the high proportion of pollard previously used. Had an ample supply of lower-quality pollard been available and the old type mashes used, it is highly probable that egg production would have been lowered substantially.

Though some poultry producers realised this fact, generally the industry was far more concerned with the economic repercussions of this change. Pollard and bran were the cheapest poultry foods available and any decrease in their use and an increase in ground grains were reflected in an increased cost of laying mashes. This was the beginning of the increase of mash prices and the rise of egg prices to the public.

It is important to note at this point that though circumstances forced more ground grains to be used in laying mashes, the cheapness of pollard and bran still caused mash manufacturers and poultry producers alike to favour putting as much pollard and bran into laying mashes as the supply position would permit. Thus right up to the present time many poultry producers favour a high percentage (up to 50 per cent.) of pollard and bran in laying mashes, largely owing to the influence of memories of the old-time pollard and bran mashes and the low cost and consequently economic value of these two meals in egg production.

## Vitamins and Proteins

During the past 5 or 6 years the spotlight has moved from the basic foods used in mashes and has been focused on proteins and vitamins. It has been almost impossible to listen to any addresses or discussions on poultry feeding without hearing emphasis placed on these classes of foods or food supplements. Stress has been laid on the necessity for ensuring that the protein content of the total ration—mash and grain—is adequate for laying birds (that is, 15 to 16 per cent. protein). Much has been done to correct the old mistake of confusing the amount of protein-rich food in a mash and the amount of actual protein available. Furthermore, attention has been focused on the value of milk powders as a source of animal protein. In short, no poultry producer today should be ignorant of the protein requirements of his laying stock. Whether all mash manufacturers have acquired the same knowledge and have acted on it is open to conjecture. A check-up in this direction is overdue.

During the period under review it has been routine feeding policy when rearing chickens to include a vitamin-rich supplement such as a feeding fish oil. Only in more recent years have vitamins A and D been added to laying mashes. As stated earlier an abundance of green food had prevented any severe lack of vitamin A. However, some 5 years ago an abnormal number of cases of vitamin A deficiency in birds sent to the Department of Agriculture for post-mortem examination revealed that either the amount of green food being fed was decreasing or that its quality was poor. As a result of propaganda based on a conclusive feeding demonstration trial carried out by the Department of Agriculture, poultry producers throughout the country started feeding vitamin-rich supplements in laying mashes. Fish oils and emulsions were used exclusively at

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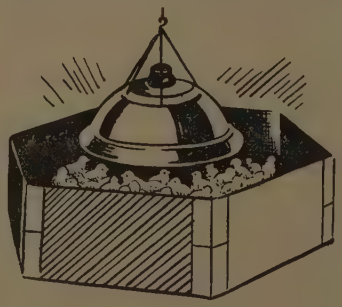

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first, but more recently these have been replaced in many cases by synthetic vitamin products as a result of more recent research into the production of vitamin-rich supplementary foods.

## High Energy Rations

It would appear that a new and important stage is now approaching when attention is reverting to the basic meals of laying mashes. It is interesting to trace the origin of this new trend in feeding. What is now known as the high energy or high efficiency ration was born of an endeavour made by American table poultry producers to place poultry meat on the market at a price equal to or lower than that of ordinary meat. This was accomplished to a marked extent by these producers achieving growth rates and food conversion efficiency (that is, amount of food consumed per pound of flesh produced) far exceeding anything which had previously been obtained with the older, conventional poultry rations.

It is common knowledge that birds require food to heat their bodies and to supply energy, including body functions and movements. This is a first demand on food. Thereafter the food is used for growth and fat production in table chickens or for egg production in adults. Heat and energy are obtained from carbohydrates and fats. The productive energy figure in this sense is usually expressed in calories per gramme of food and this in fact is a measure of the fuel value of the food consumed. Consequently, foods can be compared in value or efficiency on this basis. It is essential to appreciate that fats have by far the highest calorific value, being 2¼ times higher in this respect than carbohydrates. Proteins can be converted by birds into fat and energy, but are not fed for this purpose. Fibre, on the other hand, being only poorly digested by poultry, has the lowest calorific value.

In practice the bulk of the energy value of a ration is derived from the carbohydrate-rich foods such as cereals and their by-products. These may be divided roughly into three groups: Those such as oats and wheat by-products with a comparatively high fibre content and the lowest energy value; an intermediate group of which barley is perhaps the commonest in use; and a group with high energy value which includes wheat and maize. It is now known that poultry are more tolerant to fat than was previously considered possible. Consequently, it has been found that fat can be used in poultry rations to raise the efficiency of such rations and so reduce the quantity required for either growth or production. It is known that one commercial egg producer is in fact using fat in the ration for laying birds. It will be of considerable interest to learn later in the year just how successful this has been.

## Production of Poor Mashes

Thus it will be appreciated that for production of a higher energy or efficiency mash the requirement is foods low in fibre, which in turn mean a more concentrated, "close" mash—in fact, generally the very opposite to the type of laying mash commonly used in recent years. First, the majority of laying mashes contain between 40 to 50 per cent. of pollard and bran, which have a lower energy value than wheat or maize. Secondly, it cannot be denied that from time to time poorer coarse grains such as barley and oats are used in the remaining half of the mash. These grains of poor quality have a low energy value. Thus a mash of comparatively low efficiency is produced and sold to poultry producers.

Within the last 12 to 18 months two important things have happened. First, there was a shortage of pollard and bran. Consequently, some mash manufacturers were compelled to step up the quantity of ground grains in the laying mashes to take the place of the pollard and bran. These so-called emergency mashes were higher in price, but producers with a good sense of observation noted that their birds produced as well if not better on these mashes, **while consuming less food.** Consequently, in certain districts such producers have requested their mash manufacturers to continue to supply these higher-priced "emergency mashes", though supplies of pollard and bran are now entirely satisfactory and adequate ordinary laying mash is available.

Secondly, following the shortage of bran and pollard the price of these two meals was raised to a level comparable to that on the Australian market and approval was granted for any mash manufacturer to import pollard and bran from Australia without restriction. Thus adequate supplies of these meals have been ensured, but at a price more comparable with that of other poultry foodstuffs.

The so-called emergency mashes referred to were obviously mashes of higher efficiency than those containing up to 50 per cent. pollard and bran. Though pollard and bran were low in price, these emergency mashes appeared to be expensive, but it is highly probable that they were a better economic proposition with good stock than were their cheaper counterparts. The reduction in food consumption and the satisfactory egg production ensured this. Now that pollard and bran have risen in price, the difference in cost between the lower efficiency mashes containing up to 50 per cent. of these meals and those of higher energy value containing less pollard and bran has been lessened. It would appear that a position has now been reached when poultry producers can give serious consideration to using laying mashes of greater efficiency—in fact more similar to the high efficiency or energy mashes being used overseas. Less use of pollard and bran and more use of meals ground from good grains are the essentials in this respect.

## Proper Protein Level Essential

When high energy mashes for either chickens or laying birds are being made, it is essential to ensure that the protein level is fully maintained. The efficiency of these mashes rich in carbohydrates falls off if they have insufficient protein. Thus care should be taken to include sufficient protein-rich foods, such as meat meal and milk powders, to ensure that a layer's ration (grain and mash) gives 15.5 to 16 per cent. of protein to the birds, or that a chick ration gives not less than 18 per cent. of protein to birds during their first 6 to 8 weeks. This means more protein than is present in the usual 10 per cent. meat meal so commonly associated with laying mashes by poultry producers.

## Possible Disadvantages

Though lower food consumption and improved egg production have been mentioned in connection with the use of high efficiency mashes, certain difficulties may have to be overcome. It has been found that where very concentrated, high energy mashes are used for chickens there is an increased risk of poorer feathering and of feather picking leading to cannibalism. Similar trouble can happen with adult laying stock, particularly in larger units where the birds are at times overcrowded. The use of extra roughage (fibrous food) in the ration to overcome these troubles defeats the purpose of a high efficiency or high energy mash. An endeavour to avoid these troubles by good ventilation, no overcrowding, and debeaking is preferable to reducing the efficiency of the mash.

To sum up the present position it can be stated that in New Zealand circumstances are favourable to the use of laying mashes of higher efficiency. They can be fortified with adequate quantities of protein and vitamin supplements. Both are in ample supply at present. As sources of carbohydrates wheat is excellent and good barley nearly as good. It is unfortunate that supplies of home-produced maize have fallen. Compared with other grains maize at a reasonable price is as good or better than wheat as a source of carbohydrates. Maize has the advantage of being one of the most easily digested and assimilated foods available to poultry. A bigger acreage could be grown in New Zealand with a marked advantage to the poultry industry.

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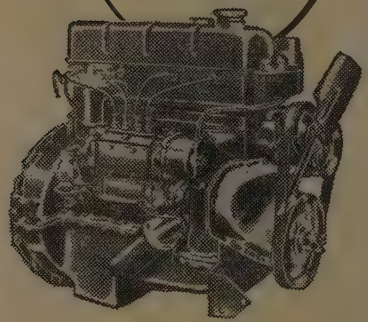

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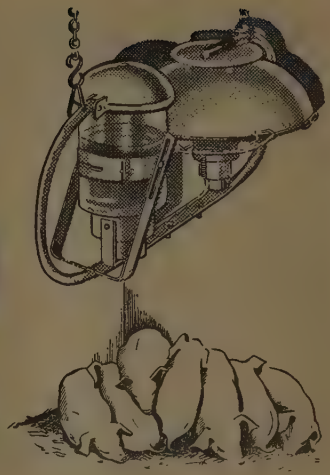

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# ANSON BOOTS FOR FARMERS

# A Cool Room for Honey

By L. H. JOHNSON,
Apiary Instructor, Department of Agriculture,
Palmerston North

A COOL room for conditioning honey is a necessity for beekeepers who pack their product into retail containers and promise local traders a continuity of supply. Not only can the granulation process be completed regardless of atmospheric temperatures, but packed honey can be stored in a controlled temperature in the heat of summer or the cold of winter.

AN article on a cool room appeared in the April 1955 issue of the "Journal" and though the general principles here outlined will be similar, there are three special features—reflective insulation, detailed drawings of a cool room door, and the incorporation of a heating unit in the same room—which have not been described before.

## The Floor

A wooden floor at the usual height from the ground is quite satisfactory to build a cool room on. If the rows of foundation piles are the permissible 6ft. apart, and the piles are 4ft. apart in the rows, extra supports will be required to prevent settlement when tons of honey are stored on a limited floor space.

Concrete blocks 12in. x 12in. x 12in. deep may be placed in position under the floor. An extra 4in. x 3in. sleeper may be fixed under the joists and 4in. x 3in. uprights from the blocks to the sleeper will ensure a solid floor.

## The Framework

It is better to build on to a partition wall or an outside wall that is on the cool side of the building. Inside measurements of the cool room are 7ft. x 8ft. x 6ft. 8in. high. The walls may be framed up with 3in. x 2in. sawn timber and 4in. x 2in. ceiling joists spaced at 16in. centres. A row of dwangs should be cut in between the ceiling joists next to the plates. Deckings of 6in. x 1in. tongued and grooved timber should be laid and fixed on top of the ceiling joists. The outer sides of the studs may be lined with hardboard or other suitable wall sheathing. The frame is now ready for the insulation.

An interior view of the cool room showing the evaporator coil, tubular heaters, and cartons of honey.

The electric meter board with the master switch. The three switches on the left from top to bottom are for the fan, solenoid, and tubular heaters. The motor switch is below.

## Reflective Insulation

The introduction of a combined reflective insulation and moisture barrier for cool rooms has not only simplified construction but has greatly reduced costs.

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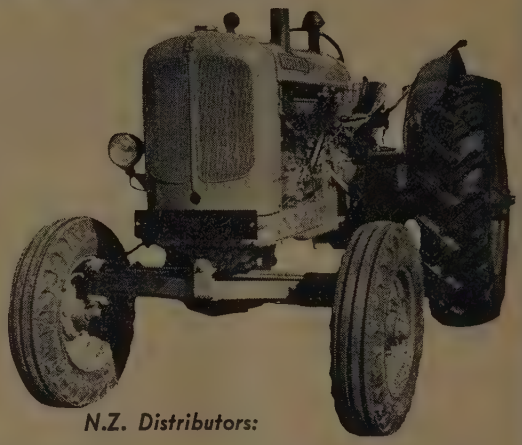

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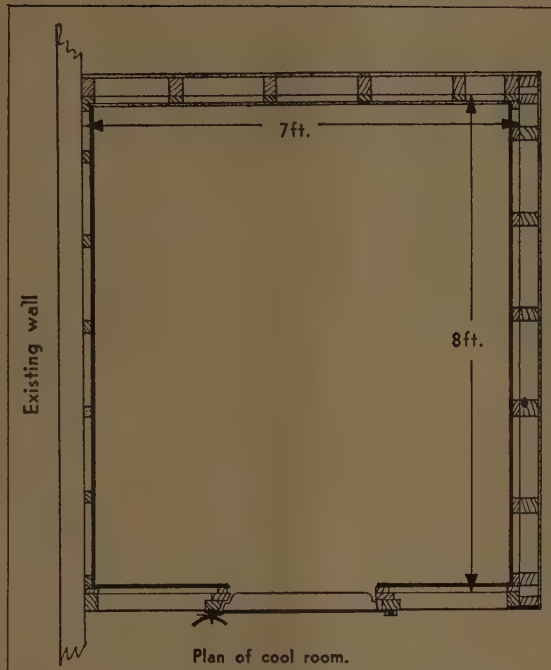
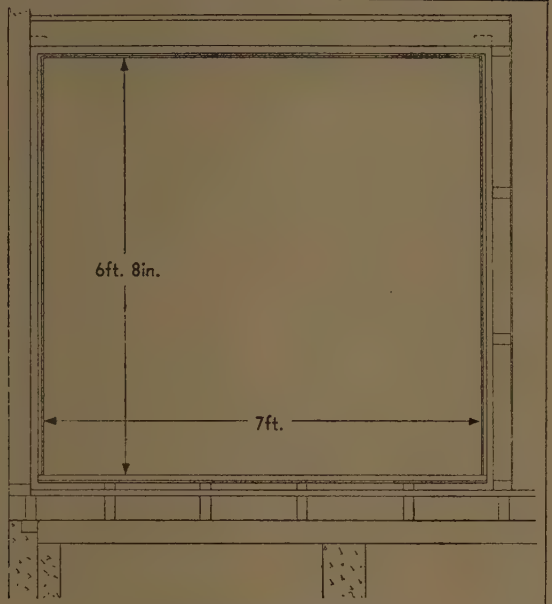



Plan of cool room.




Section through cool room.

spaces. When properly applied this type of insulation will reflect a proportion of radiant heat. Entry of heat by conduction and convection is easily coped with by the refrigeration unit.

## Spacing and Fixing the Insulation

All walls should be made vermin proof before any further work is done.

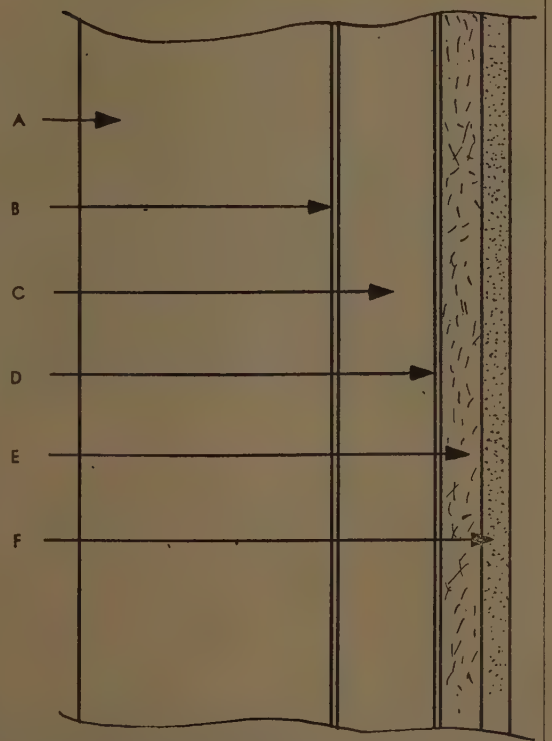
The aluminium kraft, 3ft. wide, may be stretched over the floor, studs, and ceiling joists. All joints should be lapped at least 2in. over solid timber and fixed with clouts. Strips of 1in. dry timber should now be fixed over the floor joists, studs, ceiling joists, and at all internal angles. The fabric must not be pierced. Over these strips aluminium kraft is stretched and fixed. There will now be an inch space between the reflective surfaces. If single-sided aluminium kraft is used, the bright sides should be facing the inch spaces. Double-sided aluminium kraft is preferable, as this would also reflect into the outer spaces. All the inside surfaces may now be covered with a single thickness of wood-pulp softboard.

For the floor 6in. x 1in. dry tongued and grooved timber should be laid over the softboard and nailed through to the 2in. x 1in. strips on the existing floor.

Hardboard may now be fixed on to the studs and ceiling. Moulded strips of timber will make a good finish to all joints and angles.

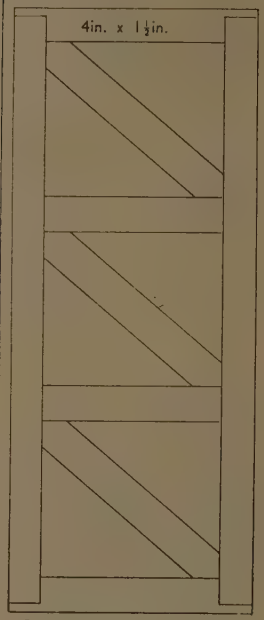
## The Door

A combined stud and door jamb for each side, also a trimmer and door frame head (equalling the thickness of the wall), may be made by fixing together and nailing in position lengths of 3in. x 1½in. timber with the outside pieces set back 1in. to form a rebate for the door. As the door is not a readily available factory product, it may be built on the job. The frame should be of 4in. x 1½in. dry timber with the braces taking the thrust on the hinge side. On the back of this frame 6in. x 1in. timber may be screwed in place, leaving a rebate of 1in. all round.

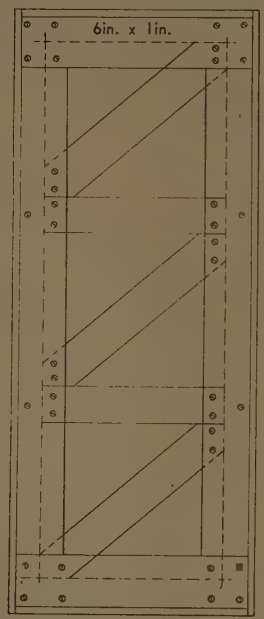



Section through wall. A—Stud. B—Aluminium kraft. C—1in. space. D—Aluminium kraft. E—Softboard. F—Hardboard.

# COOL ROOM FOR HONEY

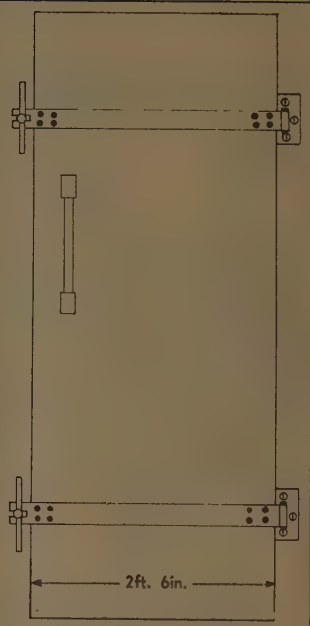



Door frame—outside view.

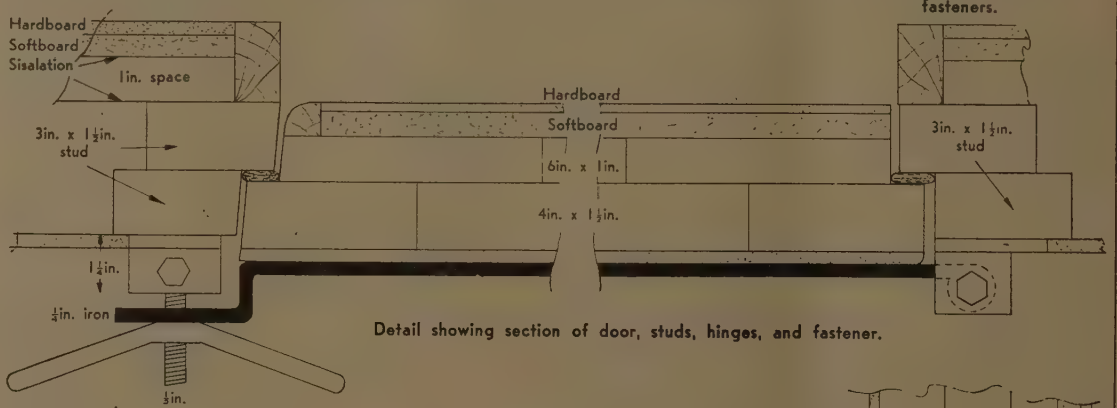



Door frame—inside view.

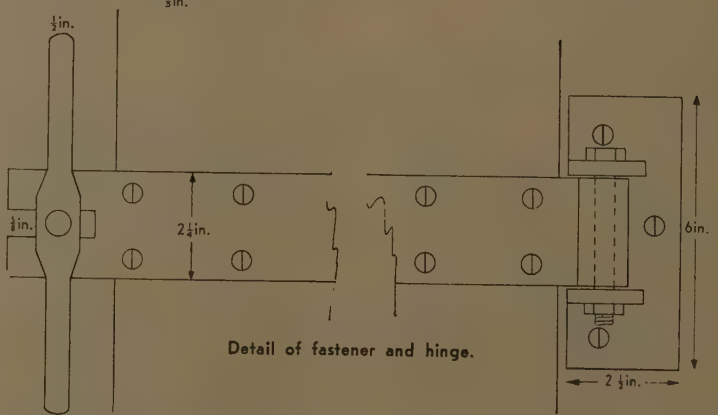
End view.



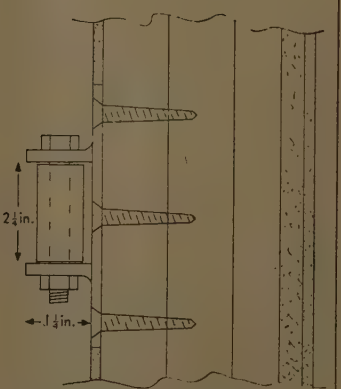

Door with hinges and fasteners.




Detail showing section of door, studs, hinges, and fastener.




Detail of fastener and hinge.




End view of hinge screwed to stud.

Aluminium kraft may be stretched completely over this frame. Fix one thickness of softboard to the inside face and finish with a sheet of hardboard on both sides.

## Hinges and Fasteners

Hinges and fasteners will need to be made by a blacksmith.

The drawings are self-explanatory.

Heavy-gauge screws or coach bolts should be used to fix the hinges to the stud. The two projecting threaded bolts on which the wing nuts will run should be made with the inner ends turned round to form hinged joints. For a quick release each may be slackened and the hinged unit with it turned outward through the slot.

To make an airtight seal a low-temperature door gasket filled with sponge rubber should be fixed to the door rebate. The raised floor should be in line with the door rebate. To prevent the raised floor from wearing away at the door edge a strip of iron 2in. x 3/16in. should be recessed and screwed to the floor in the doorway. A metal handle is required on both sides of the door. When shut the door should be flush with the wall.

## Finishing

The inside and outside of the cool room should be given three coats of water-resisting white paint.

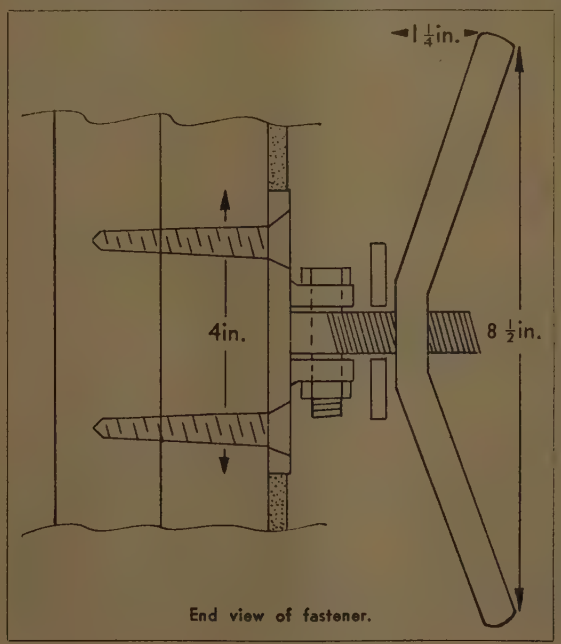
## Lighting

An electric light inside the cool room is necessary. In conjunction with this a pilot light connected to the same switch and fixed on the outside near the door will always show whether the inside light is on or off when the door is shut.

## Refrigeration Unit and Heating Elements

The cool room illustrated has been installed by Mrs. N. Andersen, of Feilding. A standard refrigeration unit is operated by a ¼ h.p. motor and the inside fan by a 1/40 h.p. motor. An electrical solenoid has been fitted to cut the flow of refrigerant to the coil in the cool room. The unit is set to maintain a cool, dry atmosphere.

A special feature of this installation is the provision of heat when required. Two tubular electric elements each



End view of fastener.

The refrigeration unit on the cool side of the building. A floor board is removed to admit cool air.

of 240 watts are fixed to the wall and are under thermostatic control. The fan which works with the refrigeration unit is on a separate circuit so that it will also operate when the heat is on. On the wall outside the cool room there are three switches, one each to control the fan, the solenoid, and the heating elements.

## Cool Room in Operation

A small tank 3ft. x 2ft. x 20in. deep set on a honey house wagon is suitable for preparing starter honey. As the whole unit is mobile, it may be run with the tank three-quarters full of honey into the cool room and left until the liquid is semi-granulated. When the honey is ready the unit may be moved to the packing room. If provision has been made for a gear-type pump to be connected to this tank, starter honey can then be pumped

## HONEY COOL ROOM . . .

to any one of the tanks having liquid honey.

The small tank is maintained with starter honey and kept in the cool room.

Liquid honey in the tanks with the starter added is thoroughly stirred with a mechanical agitator and then packed into retail containers. All the small containers are packed into cases and are then stacked in the cool room, where under a controlled cool temperature the process of granulation is hastened, resulting in a fine-textured honey. Packed lines of honey are usually left in the cool room for a week and are then dispatched to traders.

From December to March tons of honey in cartons may be stored in the cool room and sold as required. This avoids loss through fermentation in warm weather.

### The Heating Unit

It is well known that winter temperatures will cause honey to granulate very hard. In this condition it is not ideal for the table. An endeavour has been made to overcome this to some extent by installing a heating unit in the cool room. When the outside atmospheric temperature drops below 50 degrees F. the refrigeration unit is switched off and the heat is applied with the fan still running. The inside temperature is raised and held at 85 to 90 degrees for several days.

Stored honey is then softened and will remain so. It may be sent out to reach consumers in a nice, pliable condition.

Honey which spreads smoothly is ideal for the table. With modern equipment the processing of honey to obtain a smooth grain and pliable condition is mainly obtained by the throwing of switches.

### Costs

Obviously the capital outlay and running expenses are added production costs which the producer does not expect to recover by higher prices, but by maintaining sales on a competitive market.

Building costs are almost always rising and usually the costs are more than the estimate. Labour charges can also vary as much as material costs.

Mr. E. J. Whalley, of Parapara Road, Wanganui, has recently built a cool room with 56 sq. ft. of floor space. The approximate costs of materials were:—

| | £ | s. | d. |
|---|---|---|---|
| Timber framing .. | 10 | 0 | 0 |
| Flooring .. .. .. | 6 | 0 | 0 |
| Softboard .. .. | 5 | 10 | 0 |
| Hardboard inside and out .. .. .. | 14 | 0 | 0 |
| Aluminium kraft .. | 10 | 0 | 0 |
| Door .. .. .. | 12 | 0 | 0 |
| Nails .. .. .. | | 10 | 0 |
| Paint .. .. .. | 3 | 0 | 0 |
| | 61 | 0 | 0 |
| Refrigeration unit installed .. .. | 184 | 0 | 0 |
| | 245 | 0 | 0 |

Detailed costs of the door, 2ft. 8in. by 6ft. 3in., were:—

| | £ | s. | d. |
|---|---|---|---|
| Timber .. .. .. | 2 | 12 | 6 |
| Hinges and fasteners .. | 5 | 12 | 6 |
| Softboard .. .. | | 10 | 0 |
| Hardboard .. .. | 1 | 10 | 0 |
| Aluminium kraft .. | | 12 | 0 |
| Screws .. .. .. | | 2 | 6 |
| Paint .. .. .. | | 5 | 0 |
| | 11 | 4 | 6 |

These prices do not include labour.

# Radio Broadcasts to Farmers

RADIO broadcasts to farmers will be given during September as follows:—

**1XH Hamilton, 12.33 p.m.**

10 September—"Equipment for the Hen House", by W. L. Jourdain, Poultry Instructor, Department of Agriculture, Hamilton.

17 September—"Supplementary Crops", by H. M. Bull, Instructor in Agriculture, Department of Agriculture, Hamilton.

24 September—"Animal Pests and Their Cost to New Zealand", by J. J. Shine, Federated Farmers, Hamilton.

**1YZ Rotorua, 7.15 p.m.**

13 September—"Bloat and its Control", by A. V. Allo, Instructor in Agriculture, Department of Agriculture, Tauranga.

26 September—"Curd Preservation", by H. H. Preston, Supervisor, Bay of Plenty District Pig Council, Whakatane.

27 September—"Cleaning and Sterilising of Milking Machines", by J. B. Cockerton, Special Inspector, Department of Agriculture, Hamilton.

**2ZA Palmerston North, 12.33 p.m.**

3 September—"Care of the Sow and Litter", by D. R. Thomson, Livestock Instructor, Department of Agriculture, Palmerston North.

10 September—"Pasture for Seed Production", by F. G. Spite, Instructor in Agriculture, Department of Agriculture, Masterton.

17 September—"Principles and Practices of Plant Quarantine", by T. N. Flint, Plant Quarantine Officer, Department of Agriculture, Palmerston North.

24 September—"Clean Seed and Dirty Seed", by A. V. Lithgow, Officer-in-charge, Department of Agriculture's Seed-testing Station, Palmerston North.

**2XA Wanganui, 8 p.m.**

9 September—"For the Country Woman", by Mary Macdonald.

13 September—"The Radio Vet.", by S. Jamieson, Veterinarian, Department of Agriculture, Wanganui.

20 September—"External and Internal Parasitic Diseases of Pigs", by C. M. Bailey, Supervisor, Taranaki Pig Council.

27 September—"Rationed Grazing", by A. A. Duncan, Instructor in Agriculture, Department of Agriculture, Wanganui.

**2YZ Napier, 7.10 p.m.**

11 September—"Seed Certification", by F. H. Collin, Fields Instructor, Department of Agriculture, Hastings.

25 September—"Cleaning of Dairy Equipment", by L. W. Scott, Farm Dairy Instructor, Department of Agriculture, Hastings.

**3YA Christchurch, 12.20 p.m.**

3 September—"Disease Control in the Home Garden", by L. C. Hurndell, Horticultural Instructor, Department of Agriculture, Christchurch.

17 September—Review of "The New Zealand Journal of Agriculture", by E. G. Smith, Instructor in Agriculture, Department of Agriculture, Rangiora.

**4YA Dunedin, 12.30 p.m.**

4 September—"Seasonal Reminders in the Orchard and Vegetable Garden", by A. G. Kennelly, Horticultural Instructor, Department of Agriculture, Dunedin.

11 September—"Fertiliser Responses in North Otago", by D. G. Reynolds, Instructor in Agriculture, Department of Agriculture, Oamaru.

18 September—"Farming in West Otago", by T. L. Reid, Fields Instructor, Department of Agriculture, Gore, and a local farmer.

**4YZ Invercargill, 7 p.m.**

4 September—"Work at Grasslands, Gore", by A. Harris, Officer-in-charge, Grasslands Substation, Gore. "Swamp-land", by I. R. Falconer, Fields Instructor, Department of Agriculture, Invercargill.

11 and 18 September—"Work at Grasslands, Gore", by A. Harris. "Topdressing of Tussock", by T. Sewell, Instructor in Agriculture, Department of Agriculture, Gore.

25 September—"Tile Drainage", by I. R. Falconer. "Farming in West Otago", by L. Reid, Fields Instructor, Department of Agriculture, Gore.

**Regular Sessions**

**1XH Hamilton**, Mondays at 12.33 p.m. and Tuesdays at 8 p.m. (Frankton stock market report), Wednesdays at 12.33 p.m. (report from Ruakura Animal Research Station), Thursdays at 12.33 p.m., Fridays at 8 p.m. (stock sale review).

**1XN Whangarei**, Mondays at 8 p.m. (Northland livestock report and "Farming for Profit"), Wednesdays at 8 p.m. ("Farming for Profit"), Fridays at 8 p.m. ("News for the Farmer").

**1YA Auckland**, Mondays at 12.33 p.m., Tuesdays, Wednesdays, Thursdays, and Fridays at 7.45 p.m., and Saturdays at 6 p.m.

**1YZ Rotorua**, Mondays at 12.33 p.m. (Waikato stock market review), Tuesdays at 7 p.m. (Hamilton stock market report), Wednesdays at 7.15 p.m. (Pig Council talk on fourth Wednesday of every other month), Thursdays at 12.33 p.m. and 7.15 p.m. (fortnightly).

**2XA Wanganui**, Wednesdays at 8 p.m. (Wanganui stock sale report), Thursdays at 8 p.m.

**2XG Gisborne**, Tuesdays at 8 p.m., Fridays at 8.2 p.m. (Gisborne stock market report).

**2XN Nelson**, Thursdays at 8 p.m.

**2XP New Plymouth**, Thursdays at 8.1 p.m.

**2YA Wellington**, Mondays at 7.15 p.m. Thursdays at 12.33 p.m., Fridays at 7 p.m. (Feilding stock market report).

**2YZ Napier**, Tuesdays at 12.12 p.m. (Hawke's Bay orchardist session), Tuesdays at 7.10 p.m., Wednesdays at 7.15 p.m. (Hawke's Bay-Poverty Bay livestock market report), Thursdays at 12.33 p.m.

**2ZA Palmerston North**, Mondays at 12.33 p.m., Fridays at 8.45 p.m. (Feilding stock market report).

**3XC Timaru**, Mondays at 8 p.m. (Pleasant Point stock market report), Tuesdays (fortnightly) at 8 p.m. (Temuka stock market report), Wednesdays at 8 p.m., and Saturdays at 10.30 a.m.

**3YA Christchurch**, Mondays at 12.20 p.m., Wednesdays at 7.15 p.m. (Addington stock market report), Thursdays at 12.33 p.m. and 7.15 p.m.

**3YZ Greymouth**, Mondays and Thursdays at 12.33 p.m.

**4YA Dunedin**, Tuesdays at 12.33 p.m., Wednesdays at 7 p.m. (Burnside stock market report), Thursdays at 12.33 p.m.

**4YZ Invercargill**, Mondays at 12.33 p.m., Tuesdays at 7 p.m.

Wood shavings used as bedding in a round farrowing house, with a litter board on the left.

# Provision of Bedding for Pigs

THE necessity for keeping pigs warm and dry, particularly in their sleeping quarters, is well known, and bedding can be of great assistance in doing this, provided the right type of material is used. The use of bedding for pigs and the advantages to be gained from providing it are discussed in this article by I. H. Owtram, Extension Officer in Pig Husbandry, Department of Agriculture, Wellington.

BEDDING for pigs has been looked on with disfavour in New Zealand, certainly in the North Island, for many years. With the introduction some years ago of warmer material for floors, such as coke breeze concrete, the use of bedding became less general and was even advised against. This was largely owing to the fact that hay was the material used almost universally.

## Hay Unsatisfactory

Hay has always been unsatisfactory for bedding for pigs. It rapidly becomes damp and soiled, owing to its inability to absorb much moisture, and cleaning it out entails hard and unpleasant work. In farrowing houses the sow often bunches hay up under the farrowing rails, making them useless, and it is a danger to new-born piglets because often they get tangled up in it. The unpopularity of bedding for pigs among farmers was largely due therefore to the unsatisfactory nature of hay, which was almost the only bedding used in the North Island.

## Straw

In the South Island the situation is somewhat different, as in many areas there good straw can be obtained at a reasonable price. Straw is far better than hay for bedding down pigs and its use for this purpose is almost standard practice overseas.

## Wood Shavings

However, another material that is available almost everywhere, often merely for the cost of cartage, is shavings from joinery factories, timber merchants, and similar concerns. The use of factory-dressed timber has increased considerably over the last 20 to 30 years and as a result a plentiful supply of shavings is available.

Shavings are an excellent bedding material for pigs. They absorb moisture well, are not too dusty, and do not get bunched up into solid heaps by the pigs; in fact pigs tend to keep them fairly evenly spread. When it is necessary to clean them out shavings can be handled easily with a shovel and broom, and they rot down well on a manure heap.

When shavings are used steps must be taken to ensure that they remain where they are supposed to be, that is, inside farrowing houses and on the sleeping floors of other houses.

In round farrowing houses this is accomplished by the use of litter boards. These are fixed between the edges of the semi-circular baffle inside the house and the walls. They serve a dual purpose, as they keep the shavings used as bedding in the part of the house where it is required and they prevent newly born piglets from wandering out of the house. In a square farrowing house a similar board placed across the doorway will serve the same purpose.

When young pigs are moved from the farrowing house to the fattening house they nearly always foul their sleeping quarters. This is largely due

## PROVISION OF BEDDING FOR PIGS

Shavings in a wooden frame on the sleeping floor of a fattening house.

to the pigs being cold and the area of the sleeping floor being too large for the pigs at this stage of growth. A remedy is simply to construct a frame of 6in. x 2in. timber on edge of such a size as to occupy about a third of the area of the sleeping floor. Inside this frame is placed a bed of shavings 3in. to 4in. deep.

The pigs will sleep dry and warm inside the area surrounded by the frame and will keep it dry and clean. As the pigs grow the size of the sleeping area must be increased. This is done either by changing the frame or moving the pigs into another pen where there is a larger frame. This latter course is commoner, as where a fattening house with a number of units is in use pigs are usually moved toward one end of the house as they grow, so that they always end up as finished porkers or baconers in the same pen.

Another point about the use of shavings as bedding in farrowing houses is that it has been found that piglets do not suffer nearly so much from swollen leg joints. When suckling, piglets often get the skin broken on their knees and infection enters and causes swollen joints, commonly known as arthritis. Four inches of shavings as bedding appear to prevent this damage and the result is a great reduction in arthritic joints.

Shavings are easy to obtain, easy to handle, and form a very satisfactory material for bedding down pigs. It is simple to keep them in the part of the pig house where they are required.

# Control of Buttercup in Pastures

BUTTERCUPS, of which there are six common species, are widespread throughout New Zealand and two or three varieties can become serious weeds of pastures where conditions favour them rather than the pasture grasses and clovers. These conditions occur when soil fertility has been built up under cattle grazing on land that is subject to some drying out in late summer and autumn and tends to be wet and cold in winter and early spring.

The buttercups which invade pastures under these conditions are free seeders and thus soon build up a heavy population to the further detriment of the pastures. One of them, the giant buttercup (*Ranunculus acer*), is also a perennial with a strong, creeping rootstock and tall, strong stems and is a particularly bad weed very difficult to control on dairy farms in many districts. Fortunately all species of buttercup annuals as well as the more persistent perennials are susceptible to the right hormone weedicide and can be controlled and eventually eliminated from good pastures by spraying.

Both MCP and 2,4-D applied at 1lb. of acid equivalent per acre in 30 to 40 gallons of water are effective in controlling annual buttercups, but both these chemicals are liable to be very severe on the clovers, thus allowing fresh establishment of the buttercup from seeds. Preparations of 2,4-D give poor results on giant buttercup; MCP must be used for effective control. The most effective preparation is the potassium salt of MCP. The more recently discovered MCPB materials will give excellent control of annual buttercups without clover damage. It is not known if these preparations are effective against giant buttercup.

Spraying with a boom sprayer should be done in mid-spring as the buttercups are showing up and before they run to flower. Good results have also been obtained by spraying in early autumn and following with a spring spraying.

Because the conditions under which the buttercup is able to invade and increase in pastures are sometimes outside the control of the farmer, it is likely that in some districts spraying of pastures for buttercup control will have to be kept up as a control measure. In many cases, however, pasture improvement effected by improved drainage, good grazing management, and reseeding to better pasture species will prevent the continued ingress of buttercup, particularly the giant species and such improvements are well worth considering.

—*E. M. BATES,*
*Instructor in Agriculture,*
*Department of Agriculture,*
*Hawera*

# Pasture Topdressing in North Island

By C. DURING,
Research Officer, Department of Agriculture, Wellington

IN this article, the second of a series on fertiliser requirements of North Island soils which began in the July "Journal", the author discusses present knowledge of topdressing of pastures and lucerne for a widespread group of soils, those derived from volcanic ash. The concluding article in the series to appear in next month's "Journal" will summarise the fertiliser requirements for lucerne and pasture growth of brown and red-brown soils and alluvial soils.

THE soils discussed here are the soils partly or wholly derived from air-borne volcanic ash. They alone cover an area of about 15,000,000 acres, or more than half the total area of the North Island. They are well-drained soils and are therefore ideally suited to carry the bulk of the dairy industry.

## SOILS DERIVED FROM VOLCANIC ASH

Most of the North Island has been covered by one or a number of ash showers which have influenced the character of soils from Wanganui to Auckland and from Eskdale to Waihi. On steeper slopes in this large area rain has tended to wash away the ash and has exposed the original hill soils, old yellow-brown earths derived from sedimentary rock. On the flats rivers have deposited this ash as alluvium, particularly in the Waikato, round Manukau Harbour, and in the Bay of Plenty. All soils except those derived from the relatively old Hamilton shower are very friable, often fluffy if cultivated, and easily worked. On account of this friability they are termed yellow-brown loams as distinct from the yellow-brown earths already discussed.

Two main groups of soil-forming ash can be roughly distinguished in New Zealand, rhyolitic ash and andesitic ash. The rhyolites are lower in total lime, iron, magnesium, cobalt, and phosphorus content than the various types of andesitic ash, which have been erupted as air-borne showers. On the other hand some of the andesites are lower in total potash than the rhyolites. In general, however, all soils derived from volcanic ash or from volcanic rocks for that matter tend to become potash deficient under intensive pastoral farming. Not all ash showers, however, can be classed definitely as of andesitic or of rhyolitic origin.

The ash covering much of the Waihi and Whakatane districts and the dominant ash shower of Otorohanga County (Mairoa ash) could be classed as intermediate between a typical andesitic and a typical rhyolitic ash.

▲ A typical landscape in one of the wider valleys of the King Country. In the foreground is a soil developed from Mairoa ash (good phosphate response and light lime response; a potash response is likely). In the centre is an alluvial flat derived from volcanic ash and sedimentary rocks. Here a soil analysis is helpful in deciding on a topdressing programme. In the background are steep sandstone hills. Pastures on soils on these hills are likely to respond strongly to lime and possibly to molybdenum. The mantle of volcanic ash which may have once covered these hills has been largely removed by gradual erosion. National Publicity photograph.

### Volcanic Ash Soils of Taranaki

Taranaki volcanic ash soils are derived from andesitic ash deposited in Taranaki by several volcanic eruptions.

Central Taranaki is covered mainly by the relatively young Stratford shower which has given rise to light, sandy soils. In north and south Taranaki and east of Stratford in the hills the older, more weathered Egmont ash forms the parent material. In spite of the common parent material of north and south Taranaki soils, however, differences in average annual rainfall have produced soils of somewhat differing manurial require-

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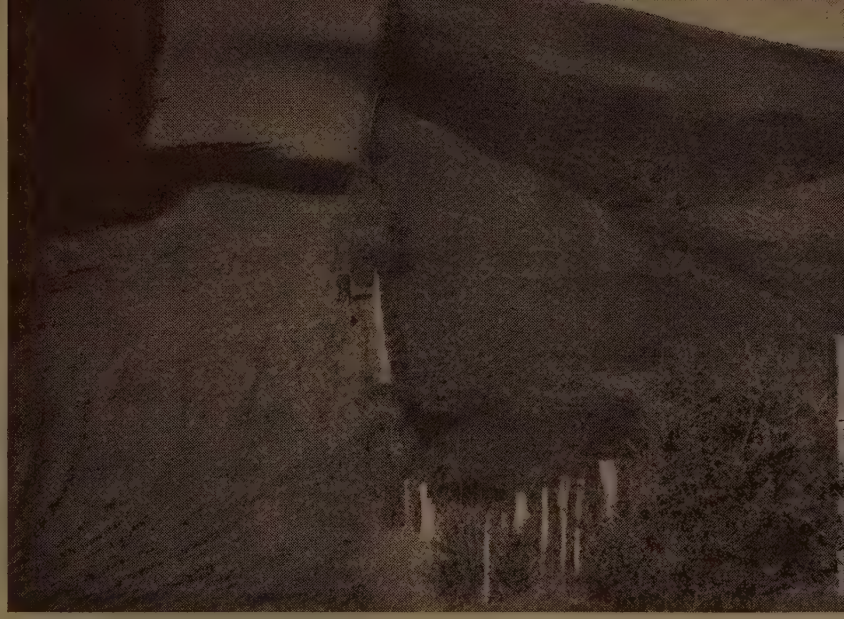
ments. In the higher-rainfall (60in.) areas of north Taranaki higher rates of phosphatic and potassic fertilisers seem to be needed to maintain satisfactory pastures. In the north the Truog test for available phosphate seldom rises above what is called medium value (7 parts per 50 million phosphorus in extract), even on fields which have been heavily topdressed with phosphatic fertilisers in the past. Potash deficiencies are widespread and severe, annual dressings of 1cwt. to 1½cwt. of muriate of potash being often desirable. On the soils of south Taranaki (rainfall 45in. to 50in.), good pastures seem to be maintained with lighter rates of phosphatic and potassic fertilisers. The Truog soil test for phosphate not uncommonly indicates high levels.

Pastures on soils of central Taranaki derived from Stratford ash and exposed to very high rainfall, 60in. and over, have similar manurial requirements to those of north Taranaki, though the north Taranaki soils are partly derived from a different ash shower, the much older Egmont ash.



The fence divides two farms at Uruti, north Taranaki. Both are on the same soil type (New Plymouth sandy loam) derived from Egmont ash and developed under an average annual rainfall of 60in. to 80in. The field on the left is high producing and has been topdressed with phosphate and potash. That on the right is covered with blackberry and has received no fertiliser.

**Pasture Responses**

Manurial requirements and responses of the soils derived from Egmont and Stratford ash can be summarised as follows:—

**High-rainfall districts** (average annual rainfall 55in. and over) gave very good responses to superphosphate, serpentine superphosphate, and basic slag and have high maintenance requirements of phosphatic fertilisers.

A limited number of field experiments indicate that on paddocks which have been topdressed regularly with phosphatic fertilisers for many years phosphate responses to further dressing may be restricted to a short period of the year, in late autumn and winter, no pasture responses being likely in spring and summer.

Good pasture responses to potash are obtained on the majority of fields, dressings of 1cwt. or over of muriate of potash per acre being desirable.

Serpentine superphosphate is preferred by many, not because it is necessarily superior to superphosphate but because it provides some magnesium, an element which, though in adequate supply initially, is expected to become short after years of intensive farming.

**Lower-rainfall districts** (average annual rainfall 40in. to 50in.) are thought to have lower maintenance requirements of phosphatic and potassic fertilisers. Potash deficiency is not as severe or as widespread.

**All districts:** No responses to lime were obtained in experiments during the past 10 years.

No responses to the minor elements (molybdenum, zinc, boron, copper, and magnesium) have been observed.

Of the minor elements molybdenum has been studied in an adequately large number of trials; boron and magnesium have been studied in a small number of trials.

The cobalt status of pastures grown on Egmont and Stratford ash is probably adequate on most fields (1).

## From Tongariro Ash

Tongariro ash soils are derived from a fine andesitic ash erupted from Tongariro at probably the same time as the Stratford ash was deposited in Taranaki (2). Much of the Tongariro ash has since been buried under later pumice showers. Soils derived from Tongariro ash (Ohakune silt loam) cover the higher basin of Ohakune and Raetihi and the hills to the south. This area has a high average annual rainfall (60in. to 70in.) and cold winters.

**Pasture Responses**

On untopdressed country phosphatic fertilisers, whether superphosphate, basic slag, or North African rock phosphate, give excellent results. In some experiments phosphate topdressing combined with oversowing of white clover changed third-class, weedy pastures into good, white clover-dominant swards. The residual value of phosphatic topdressing may be considerable. In one experiment responses to three annual dressings of 3cwt. of superphosphate per acre have shown little signs of waning after 2 years without topdressing. Pastures on Ohakune silt loam (the most important soil in this series) do not respond to lime. Unfortunately, however, these soils, like those of the high-rainfall areas of Taranaki, have low reserves of available potash. For intensive farming annual dressings of 1cwt. to 2cwt. of muriate of potash per acre may become necessary, particularly on fields which are frequently cut for hay or silage.

No pasture responses to trace elements have been observed. Only molybdenum, however, has been examined for a sufficiently long time and by an adequate number of trials.

## From Mairoa Ash

The so-called Mairoa ash is thought to be a mixture of andesitic and rhyolitic ash which was deposited intermittently at about the same time as the Egmont ash of Taranaki (2).

The eastern part of the Mairoa shower, which lies nearer to the sources of rhyolitic eruptions, may, therefore, contain more pumice and less andesite than the western and southern parts. But the Mairoa ash not only exhibits differences in parent material; it also occurs in an area subjected to considerable variation in average annual rainfall. In the Waikato (Ohaupo silt loam) the average annual rainfall is 45in. to 50in.; in the central part of the northern King Country it may rise to 60in. and toward the west coast, on the higher plateaux and hills, to 80in. and even 100in.

The Mairoa ash showers covered hill country from Ohura in the south to Huntly in the north. From many of the steeper slopes, however, it has

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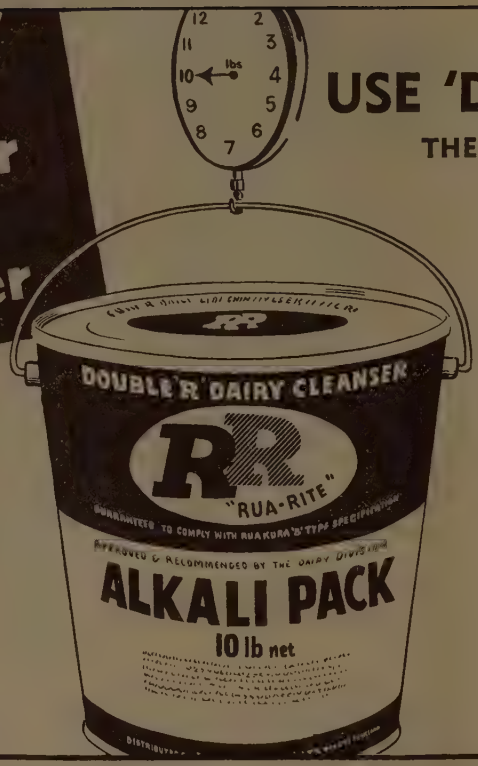


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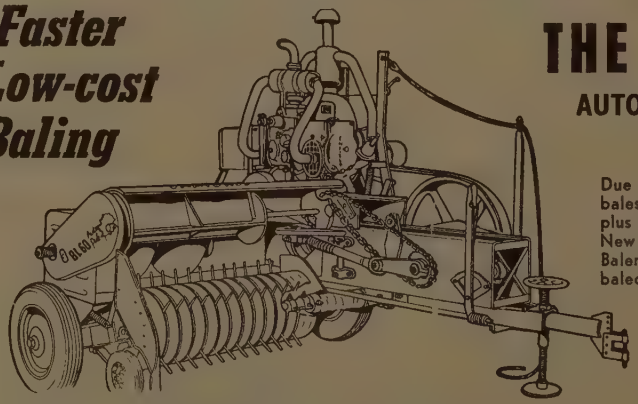

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been washed off. Soils derived from Mairoa ash are also found on the easy to rolling land of south Waikato and the northern King Country, and alluvial soils strongly influenced by these showers are found from the King Country to Auckland.

These variations in parent material and climate have left their imprint on the appearance of the soils derived from Mairoa ash but have had, as far as is known at present, little effect on the fertiliser requirements of these soils.

**Pasture Responses**

The following pasture responses to lime and fertilisers are common to soils derived from the Mairoa ash complex:—

Sometimes a slight response to lime at 1 ton per acre.

**Without lime:** Fair response to superphosphate, reverted superphosphate, and serpentine superphosphate; very slightly better response to basic slag.

**With lime:** Good responses to superphosphate and its derivatives, basic slag on the average being slightly less efficient.

Potash deficiencies are very common on soils of south Waikato (Ohaupo silt loam, Otorohanga silt loam), not, it is thought, because these soils are inherently less well supplied with this element, but simply because they have been farmed more intensively.

In the higher-rainfall areas of the west coast and the King Country farming has been commonly less intensive. In the hilly districts, energies and finance have been directed mainly toward fighting ragwort, other weeds, and secondary growth, and toward maintaining reasonable fencing. Some phosphate fertilisers and a little lime were applied irregularly, but in recent years aerial topdressing has helped to intensify pasture manuring and to open up land smothered by weeds or lying under scrub.

Potash deficiency has not yet become a problem, but there is little doubt that in areas receiving 60in. of rainfall and over lack of available potash will in a relatively short time become a factor of major importance under fairly intensive farming. As reasonably good pastures are needed to prevent the spreading of secondary growth and weeds in high-rainfall areas, and as the expensive potash fertilisers may become essential in maintaining these pastures, it is likely that it will be found more payable to farm a small area intensively than to farm a large area extensively as was done in the past.

Cobalt deficiencies have long been known to exist in the areas receiving the highest rainfall (average 80in. to 100in. per annum), but marginal cobalt deficiencies are now thought to occur in areas receiving less rainfall.

Molybdenum and other trace elements are being investigated now in field trials. It seems that the supply of available molybdenum at least is sufficiently high to maintain good pasture growth.

## From Hamilton Ash Complex

The andesitic Hamilton ash is the oldest of a group of soil-forming ash showers. Its ash beds have accumulated gradually over a large area, much of which is now covered by later ash showers, notably those of the Mairoa type (2).

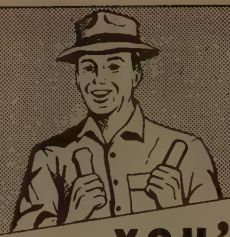
Soils derived from the Hamilton ash beds occur on the undulating country of the Hamilton basin from Ohaupo, south of Hamilton, northward as far as Tuakau, Pukekohe, and Patumahoe.

The slow accumulation of these ash beds and possible differences in parent material and the longer period of soil development have led to some marked differentiations in original fertility. Ash deposited on poor sandstone soils and on former gumlands has led to soils deficient in potash. In contrast, ash deposited on more fertile formations is at present not potash deficient.

Unlike the soils derived from more recent ash showers these soils are well weathered with age, forming clay loams (Hamilton clay loam and Hunua clay loam).

[*National Publicity*

Unimproved but cleared bush country on the Raetihi-Ohakune uplands. The soil is derived from Tongariro ash. The rainfall is high (60in. to 80in. annual average), and potential production is quite high, but is limited by cold and long winters. Only the badly drained gley soils such as are in the area shown need liming. On all other soils phosphatic fertilisers only are needed to develop pastures; potassic fertilisers become essential in the later stages of farming.



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**Pasture Responses**

Pasture responses on soils of the Hamilton group to lime and fertilisers can be summarised as follows:—

**On soils of higher original fertility:—**

Fairly good response to lime up to about pH 6.0.

Good response to superphosphate and its derivatives.

Good response to fused calcium magnesium phosphates.

Basic slag may be slightly superior to superphosphate on unlimed ground.

Potash responses are becoming more frequent in the south Auckland district, but are rare in the Waikato.

**On soils of lower original fertility:—**

Pastures respond markedly to lime.

Basic slag seems definitely superior to superphosphate on insufficiently limed soil.

Potash responses are probably fairly common.

No responses to molybdenum have been recorded.

A large number of pasture trials measuring the growth responses obtained from phosphatic topdressing have been carried out on Hamilton clay loam near Hamilton.

The results of these trials seem to indicate that on fields with fairly high Truog test for available phosphate (P = 8 to 12), the test used by the Department of Agriculture in its chargeable soil analyses service, little if any increase in pasture production can be expected from the application of phosphates.

## Waihi Ash

The Waihi ash has accumulated slowly during approximately the same period as the Mairoa ash (2). It extends from Tauranga to the foot of the Coromandel Peninsula. Very similar ash beds are also found north of Gisborne in the East Cape region, but are of little economic significance.

Soils derived from Waihi ash were among the first to be found potash deficient. Today potash deficiency is widespread, extending even to the coastal belt (Katikati black sandy loam) which was once thought to be well supplied with potash.

**Pasture Responses**

Pasture responses to lime and fertilisers can be summarised as follows:—

Responses to lime are erratic and if present, are usually slight. Occasional light dressings of lime are recommended.

Responses to serpentine superphosphate are excellent.

There is a suspicion of magnesium deficiency in these soils, which may explain the good results obtained with serpentine superphosphate, as this fertiliser contains some magnesium.

Responses to superphosphate are very good.

PASTURE TOPDRESSING IN NORTH ISLAND

*[From a map by the Soil Bureau, Department of Scientific and Industrial Research*

Basic slag is generally inferior to superphosphate.

Good responses to potash are obtained.

Molybdenum seems in good supply.

## Mainly from Andesitic Water-sorted Ash (Waitemata Suite)

The soils derived mainly from andesitic water-sorted ash are found north and south of Manukau and Waitemata Harbours, where, occurring in close association with very leached clays, they form so-called soil mosaics. Typical soil mosaics are the Karaka complex and the Waitemata complex. The lime requirements of the clays formed from sedimentary rock are very high, but the ash deposits, on the other hand, show pasture responses which are similar to those obtained on soils derived from Mairoa ash. Recently marked potash deficiencies have been demonstrated on many farms lying on this mosaic of infertile clay and ash soils. The optimum rate of maintenance dressing with muriate of potash is not yet known, but it is believed to be more than 1cwt. per acre per annum.

Magnesium deficiency is a possibility on the soils derived from volcanic ash and needs to be watched. For this reason the use of the magnesium-containing serpentine superphosphate is preferable to the use of straight superphosphate.

## From Water-sorted Andesitic Ash and Pumice Alluvium (Horotiu Suite)

The soils derived from water-sorted andesitic ash and pumice alluvium are flat to undulating and occur in large areas in the Waikato from Taupiri in the north to well past Cambridge in the south (for instance Horotiu sandy loam), and farther east in a large block of land with Matamata as its approximate centre (Waihou sandy loam). The Horotiu soils, particularly, vary from droughty coarse sands to

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sandy loams and even fine pumiceous clays with a high water-holding capacity.

**Pasture Responses**

The following pasture responses to lime and fertilisers are typical of these soils:—

Slight to good response to lime, depending on soil type. Light dressings of lime (5cwt. per acre) are effective. A soil reaction of pH 6.2 to 6.4 is desirable on the less sandy soils (Waihou sandy loam, Te Kowhai clay).

Excellent responses are obtained to superphosphate and serpentine superphosphate. Basic slag seems inferior, at least on the lighter sandy or coarse sandy loams. Potash deficiency is common. Rather high rates (2cwt. to 3cwt.) of muriate of potash per acre may be necessary in some cases to bring back vigorous clover growth to fields on which clover has virtually disappeared owing to potash deficiency. The phosphate economy of these soils has been studied thoroughly in recent years. The Horotiu and Waihou soils are known to respond to phosphatic topdressing even after phosphatic fertilisers have been applied regularly for many years. This observation is borne out by mowing trials. However, the pasture response to phosphatic fertilisers on fields which have been generously topdressed in the past are slight and short-lived; they occur in late autumn and winter only. Molybdenum seems to be in good supply for pasture growth.

## From Rhyolitic Ash (Pumice)

There are a large number of pumice ash showers, but only those of agricultural importance will be mentioned here.

**Tirau Ash**

The Tirau shower is the oldest of the soil-forming pumice showers. The ash beds have accumulated slowly at about the same time as those of the Mairoa ash and the Egmont ash (2). The source of the shower is attributed to the vicinity of Taupo. Though to a large extent covered by the much more recent Taupo shower, it remains the soil-forming material of very good farm land from Putaruru to just south of Morrinsville.

**Pasture Responses**

Pasture responses to lime and fertilisers can be summarised as follows:—

**Lime:** A good soil reaction is about pH 6.4. Responses to heavy dressings of lime have been observed at pH 6.0.

**Phosphate:** Of the phosphatic fertilisers commercially available, superphosphate and its derivatives are the most effective, though double superphosphate has not been examined critically and basic slag was used only in one or two experiments. The fused calcium magnesium phosphate "Thermophos" seems as good or better than superphosphate, but this American product is not now being manufactured.

Potash responses are common on the coarser soils (Tirau sandy loam), but uncommon on the finer soils (Kereone silt loam).

No trace element deficiencies have so far been found, but cobalt deficiency may occur. Slight molybdenum deficiency is suspected on the most leached soils derived from this ash shower (Te Tuki sandy loam).

**Gisborne Ash and Whakatane Ash**

The Gisborne ash and Whakatane Ash showers were laid down about 3000 years ago as comparatively thick layers over a large area, completely destroying most of the vegetation (2). The Gisborne ash beds consist of several showers, the soil-forming ash being a fine pumice. The Whakatane shower was erupted a little later than the soil-forming Gisborne ash and is rather coarse.

**Taupo Ash**

The Taupo shower is of quite recent origin, having been erupted about 1700 years ago (2). It consists really of a series of showers extending over a very large area from near Taihape in the south to Putaruru in the north and from the inland Wairoa-Gisborne road in the east to beyond Taumarunui in the west.

**Kaharoa Ash**

The Kaharoa shower is even younger than the Taupo shower, having been erupted only about 800 years ago. Its soil is coarser than that of most of the Taupo showers and the pumice denser and less vesicular.

**Pasture Responses on Gisborne, Whakatane, Taupo, and Kaharoa Ash**

The main features of these rhyolitic pumice soils (Gisborne, Whakatane, Taupo, and Kaharoa ash) is their low original fertility, due to acute phosphate deficiency, and the spectacular way in which they respond to even small applications of phosphate.

To establish high-producing pasture, however, from virgin scrub relatively large amounts of phosphatic fertilisers are used. For instance, for laying down pastures 3cwt. of superphosphate per acre is applied in autumn and 3cwt. per acre in spring, and from

[*National Publicity*

A farm near Waihi. The hills in the background are formed from andesitic rock. The easy and rolling country in the middle background is covered by Waihi ash. Soils derived from Waihi ash are naturally very infertile, a feature which is no doubt accentuated by the high average annual rainfall (60in. to 70in.) received by much of the Waihi district. Good pasture responses are obtained to serpentine superphosphate (probably because it contains magnesium as well as phosphorus) and to potash. The application of lime is recommended, though pasture responses to lime are only slight. In districts receiving a rainfall of 60in. and over cobalt topdressing may prove of advantage to stock thrift. High production is obtained in districts that receive relatively "low" rainfall (an annual average of 60in. and under).

▲ A scene in the Ngakuru district in the early 1930s. Today pumice lands are brought in by mechanical means. The soil in the area is Taupo sandy silt.

▼ The same area 15 years later. White clover is in flower; scrub has given way to good pastures in this block of land, which proved to be a pilot scheme for the development of several hundred thousand acres, development of which is still proceeding rapidly. Virgin pumice country belies its appearance. In spite of its apparent droughtiness and seemingly poor fertility, it can carry satisfactory pastures if it is topdressed with phosphatic fertilisers. The humus content of the pumice soils increases rapidly under such management. Some of the coarser pumice soils, however, are thought to be too dry to carry permanent pasture of the perennial ryegrass-white clover type.

then for several years an annual dressing of 3cwt. per acre seems to be justified.

On drier, coarser soils phosphatic fertilisers containing sulphur, such as superphosphate and serpentine superphosphate, are slightly superior to fertilisers containing no sulphur.

About 1930 a series of field experiments was conducted on pastures to compare superphosphate with basic slag and a mixture of equal parts of basic slag and superphosphate. Several of these trials were laid down in the Reporoa district on soils derived from Taupo ash. The mixture of superphosphate and basic slag was as good as or better than superphosphate alone.

Calcium seems generally freely available on pumice soils and in good supply, though the soils may be quite acid (this applies mainly to Taupo pumice) with pH 5.3 to 5.7. Liming is therefore of no advantage. This seems to apply also to pumice soils which have been under good pasture for a considerable time and in which the humus content has increased appreciably. Lime, however, is recommended with lucerne. Pumice soils, though having a high total potash content, tend to become potash deficient, depending on management and the length of time they have been farmed. The soil analysis for available potash used by the Department of Agriculture is regarded as giving a good indication of the potash status of individual fields.

The molybdenum content of pastures is high on some of the coarse pumice soils, but not as far as is known in those developed on fine pumice ash. Pasture levels of molybdenum toxic to stock are experienced on coarse Taupo ash near Wairoa (3). Very high levels of molybdenum occur also in pastures on soils derived from Taupo ash near Taumarunui and possibly in other places. On the other hand on some soils derived from Taupo ash pasture levels of molybdenum are quite low or normal.

A pasture response to molybdenum in a field experiment has occurred on leached Taupo ash near Matawhai, a locality which receives an annual average rainfall of 80in. to 100in.

All pumice soils are cobalt deficient, or suspected of cobalt deficiency, Tirau ash perhaps least of all.

There is no evidence of minor element deficiency with regard to pasture growth, though boron deficiency symptoms are common in swedes, turnips, and lucerne on soils derived from Taupo ash.

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1. E. D. Andrews, private communication.
2. N. H. Taylor, New Zealand Ecological Society Report, May 1953.
3. I. J. Cunningham, "New Zealand Journal of Agriculture", vol. 90, No. 2, p. 196, 1950.

*Trends in and Prospects for*

# Citrus and Sub-tropical Fruit Growing in New Zealand

By W. A. FLETCHER,
Citriculturist, Department of Agriculture, Auckland

**SINCE the 1953 orchard survey, when a total of 146,000 citrus trees was recorded, tree numbers have increased to about 150,000. The whole of this increase has been due to sweet orange and to a smaller extent mandarin plantings, lemon and grapefruit areas having declined slightly in the last 2 years.**

## CITRUS

UNUSUALLY dry spring and summer conditions in Auckland in 1954-55 adversely affected setting of lemons and grapefruit and yields of these fruits during 1955 were fairly substantially reduced in this district. Citrus crops from Kerikeri, Bay of Plenty, and Gisborne, however, did not appear to be seriously affected by the weather and were up to average.

A mild winter was experienced in all districts in 1955 and the weather up until the present has been favourable for the growth of citrus. In the main, prospects for the 1956 season's citrus crop are good, though crops of New Zealand grapefruit appear to be variable. Because of low prices many of these trees were not harvested until very late last season and in these cases much lighter crops than usual are evident.

Estimated production of citrus fruits during the 1955-56 season is tabulated below at left.

### Planting Trends

There were 4800 new citrus trees recorded in 1955. The great majority of these trees were oranges and mandarins planted mainly at Kerikeri, with small plantings in the Bay of Plenty and at Gisborne. The trend at Kerikeri is toward a gradual replacement of undesirable and uneconomic types of citrus such as Valencia oranges and standard lemons by interplanting new trees in old-established blocks. Once the young trees begin bearing the old trees will be removed. Growers are forced into this action because of the generally small size of their properties and consequent loss of income if old trees were removed and the bare land replanted. Eventually a large proportion of existing Valencia and standard lemon blocks at Kerikeri will be replaced by this method.

New plantings of lemons continue to decline and numbers recorded in 1955 were the lowest in 7 years. Lemon tree plantings were all confined to the Bay of Plenty and Gisborne districts. There were virtually no plantings of grapefruit and Meyer lemons in 1955.

Removals of citrus trees amounted to about 3200 trees in 1955 and consisted mainly of lemons and grapefruit from old, uneconomic blocks, though housing subdivision was an important cause of losses near Auckland City. Loss of trees due to subdivision at Tauranga has decreased to a low level and is no longer expected to be an important cause of losses there in the next few years.

New plantings and removals of citrus trees recorded during 1955 are tabulated below at right according to districts and varieties.

### Prospects

As a result of heavy plantings of lemons between 1947 and 1951, particularly in the Bay of Plenty, total production of these fruits is expected to increase from its present low ebb and be sufficient to satisfy demand within 3 or 4 years. The seasonal Meyer lemon is expected to comprise eventually about one-third of the total lemon production, however, and this is likely to cause an upset in the regularity of supply of these fruits. Surplus fruit during winter may be diverted into by-products or export channels, but though cool storage may help to spread the crop, it is unlikely to answer fully the problem of short supply in summer.

Since 1953 new plantings of lemons have shown a marked decline to a level which is inadequate to replace trees going out of production. At Kerikeri and Auckland in particular there is almost complete lack of interest in replacing lemon trees. Unless this decline in lemon plantings is arrested, another slump in lemon production can be expected later next decade.

[*National Publicity*
Harvesting lemons in North Auckland.

**ESTIMATED PRODUCTION OF CITRUS FRUITS DURING THE 1955-56 SEASON IN STANDARD CASES (Approx. 40lb. Net)**

| Kind | Kerikeri | Auckland | Bay of Plenty | Gisborne | Total |
|---|---|---|---|---|---|
| Standard lemons .. | 3,900 | 9,400 | 50,800 | 6,900 | 71,000 |
| Meyer lemons .. | 9,500 | 1,500 | 5,700 | 3,200 | 19,900 |
| Total lemons .. | 13,400 | 10,900 | 56,500 | 10,100 | 90,900 |
| N.Z. grapefruit .. | 22,000 | 55,000 | 40,000 | 2,000 | 119,000 |
| Wheeny grapefruit .. | 3,000 | 900 | 900 | 600 | 5,400 |
| Total grapefruit .. | 25,000 | 55,900 | 40,900 | 2,600 | 124,400 |
| Sweet oranges .. | 9,000 | 2,600 | 3,000 | 3,000 | 17,600 |
| Mandarins .. .. | 500 | 250 | 500 | 100 | 1,350 |
| Other citrus .. | 150 | 400 | 50 | — | 600 |
| Total citrus .. | 48,050 | 70,050 | 100,950 | 15,800 | 234,850 |

**NEW CITRUS TREES PLANTED DURING 1955**

| Kind | Kerikeri | Auckland | Bay of Plenty | Gisborne | Total |
|---|---|---|---|---|---|
| Standard lemons .. | — | — | 320 | 100 | 420 |
| Meyer lemons .. | — | 30 | — | — | 30 |
| N.Z. grapefruit .. | — | 20 | 10 | — | 30 |
| Wheeny grapefruit .. | — | — | 10 | 10 | 20 |
| Sweet oranges .. | 2,490 | — | 160 | 390 | 3,040 |
| Mandarins .. .. | 790 | 40 | 410 | 30 | 1,270 |
| Totals .. .. | 3,280 | 90 | 910 | 530 | 4,810 |

**CITRUS TREES REMOVED DURING 1955**

| Kind | Kerikeri | Auckland | Bay of Plenty | Gisborne | Total |
|---|---|---|---|---|---|
| Standard lemons .. | 290 | 580 | 150 | — | 1,020 |
| Meyer lemons .. | 150 | 100 | 280 | — | 530 |
| N.Z. grapefruit .. | 20 | 1,020 | 90 | — | 1,130 |
| Wheeny grapefruit .. | — | 50 | — | — | 50 |
| Sweet oranges .. | 250 | 40 | 30 | — | 320 |
| Mandarins .. .. | 120 | — | — | — | 120 |
| Totals .. .. | 830 | 1,790 | 550 | — | 3,170 |

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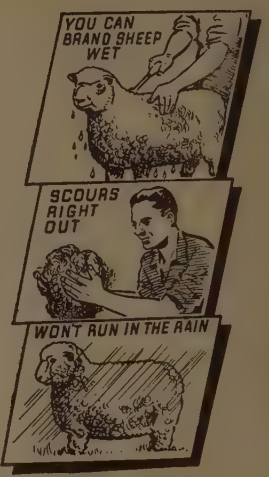


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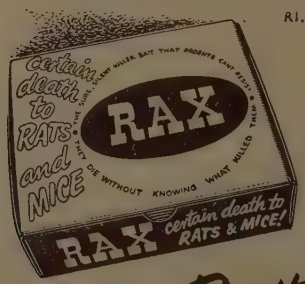


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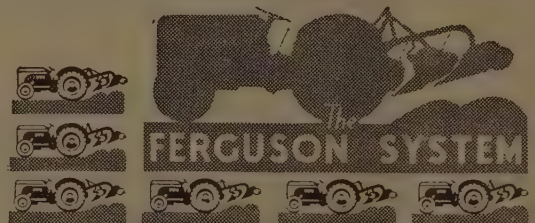


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The orchard survey in 1953 revealed that as young trees mature production of grapefruit, which seems to be already adequate to satisfy demand, is likely to increase at least 1½ times within the next few years and further aggravate the present difficult marketing problems. After rejection by growers in 1954 of a compulsory organised marketing scheme for these fruits under the control of the New Zealand Citrus Marketing Authority, a voluntary scheme through the authority was introduced, but this has not been well patronised. Market prices for grapefruit were poor in 1955 and attempts to improve returns by spreading the crop through leaving fruit to hang on the trees until late in the year were not very successful.

The trend to plant sweet oranges and mandarins continues unabated. Expansion in plantings of these fruits is being limited to some extent by a shortage of suitable nursery trees.

Most of the oranges planted are promising navel varieties. At Kerikeri the rootstock mainly used for these trees is *Poncirus trifoliata*, but until recently growers at Gisborne have not favoured the use of this rootstock, preferring the Island sweet orange rootstock instead.

A total of 31,000 orange trees was recorded in the 1953 orchard survey and more than 40 per cent. of these were only 5 years old or less. In the last 2 years the number of orange trees has increased to 36,000 and it is expected that production will increase to 30,000 to 40,000 bushels within the next 5 to 10 years. The New Zealand market at present can easily absorb this production and so long as the present favourable prices for sweet oranges are maintained it is expected that the trend to plant these fruits will continue. Under the new Cook Islands citrus replanting scheme, however, greatly increased production of oranges is envisaged and it is possible that at some time in the future large quantities of Island fruit may be marketed at the same time as New Zealand-grown oranges. This could have a depressing effect on returns for New Zealand fruit.

There were 5000 mandarin trees recorded in the 1953 orchard survey and 84 per cent. of these were only 5 years old or younger. Since the survey numbers of mandarin trees have increased to 7000. Most of these trees are Satsuma and Clementine varieties and a smaller number of the late-maturing Kara variety. Production of mandarins should increase 7 or 8 times to a total of 7000 to 8000 bushels within the next 5 to 10 years. Though good returns for these fruits are expected to be maintained, it is unlikely that the very high prices of recent years will continue once all trees at present planted have come into bearing.

## SUB-TROPICAL FRUIT

The only sub-tropical fruits produced commercially in New Zealand are tree tomatoes (*Cyphomandra betacea*), Chinese gooseberries (*Actinidia chinensis*), passion fruit (*Passiflora edulis*), and feijoas (*Feijoa sellowiana*). A few properties are devoted to the production of these fruits alone, but generally they are grown in conjunction with citrus fruits at Kerikeri, Auckland, and Tauranga and Te Puke in the Bay of Plenty.

The table on this page shows the numbers of plants, approximate acreages, and estimated production of sub-tropical fruits in the various districts during 1955.

### Planting Trends and Outlook

**Tree Tomatoes**

There were very heavy plantings of tree tomatoes during 1955. At Kerikeri more than 14,000 new plants were recorded, but only half of these were set out as orchard blocks. The remainder were planted round headlands of citrus blocks, often very close to shelter belts, and yields from these trees are likely to be much below average. A further 3000 trees were planted at Auckland and 9000 in the Bay of Plenty. Removals of tree tomatoes amounted to only 7000 plants and 6000 of these were lost from the Bay of Plenty. The total numbers of tree tomatoes increased by about 25 per cent. in 1955, but they still have not reached the peak of 103,000 plants recorded in 1951.

Production of tree tomatoes should not exceed 700 tons in 1956, and it is considered that this quantity of fruit can be absorbed by the New Zealand market without any appreciable reduction in the good returns maintained for these fruits over the past 3 or 4 years. A sharp upward trend in yields is likely the following season, and with further heavy plantings expected in 1956 there is a danger of over-production and lower returns in the future.

Frost is, however, a very important factor in the culture of tree tomatoes and a cold winter such as occurred in 1951 could affect yields and plantings considerably.

Tree tomatoes exported to Australia over the past few years have not been particularly well received and it is unlikely that any appreciable trade can be developed in the near future to absorb surpluses. One and a half tons of tree tomatoes were exported to Australia in 1955 and small shipments are to be continued in 1956.

**Chinese Gooseberries**

The area planted to Chinese gooseberries continues to expand slowly but steadily, particularly in the Bay of Plenty. There was a net increase of 1000 vines in 1955. Over-production of these fruits for the local market is also foreseen as young plants come into bearing over the next 4 or 5 years.

Export to Australia and the United Kingdom, however, shows promise for absorbing surpluses. Thirty-five tons of Chinese gooseberries were exported in 1955 and were again well received in Australia and Britain and prices were satisfactory. It is expected that a similar quantity of fruit will be sent overseas again in 1956.

**Passion Fruit**

Areas of passion fruit continue to decline in all districts except Te Puke, which now produces two-thirds of the total passion fruit crop. Expansion of passion fruit acreage is expected to continue at Te Puke and further reductions are expected elsewhere, but the total area planted to passion fruit is not likely to change greatly in the next few years.

**Feijoas**

Because of relatively low production and market returns for feijoas little expansion in numbers of these trees is expected in the near future. Practically all of the production is from trees in hedges along drives and between blocks of other fruits.

**ESTIMATED ACREAGES* AND PRODUCTION IN TONS OF SUB-TROPICAL FRUITS IN NEW ZEALAND DURING 1955**

| District | Tree tomatoes | | | Chinese gooseberries | | | Passion fruit | | | Feijoas | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Plants | Acreage | Production (tons) | Plants | Acreage | Production (tons) | Plants | Acreage | Production (tons) | Plants | Acreage | Production (tons) | Approximate total acreage | Total production (tons) |
| Kerikeri .. | 37,200 | 106 | 250 | 4,100 | 34 | 60 | 2,700 | 11 | 8 | 2,600 | 10 | 6 | 161 | 324 |
| Auckland .. | 16,000 | 46 | 90 | 2,100 | 18 | 30 | 1,100 | 4 | 4 | 2,200 | 9 | 8 | 77 | 132 |
| Tauranga .. | 29,400 | 84 | 125 | 3,600 | 30 | 63 | 4,400 | 17 | 14 | 3,100 | 12 | 14 | 143 | 216 |
| Te Puke .. | 16,600 | 47 | 115 | 3,600 | 30 | 60 | 6,500 | 26 | 50 | 700 | 3 | 1 | 106 | 226 |
| Totals .. | 99,200 | 283 | 580 | 13,400 | 112 | 213 | 14,700 | 58 | 76 | 8,600 | 34 | 29 | 487 | 898 |

* Acreage based on 350 tree tomatoes, 250 feijoas and passion fruit, and 120 Chinese gooseberry plants per acre.

Drought conditions early in 1955 slightly reduced crops of tree tomatoes and Chinese gooseberries at Auckland, and winter frosts caused a small loss of tree tomatoes in the Bay of Plenty. Generally, however, conditions were very favourable during the year for the growth of sub-tropical fruits and good crops are expected for the 1956 season.

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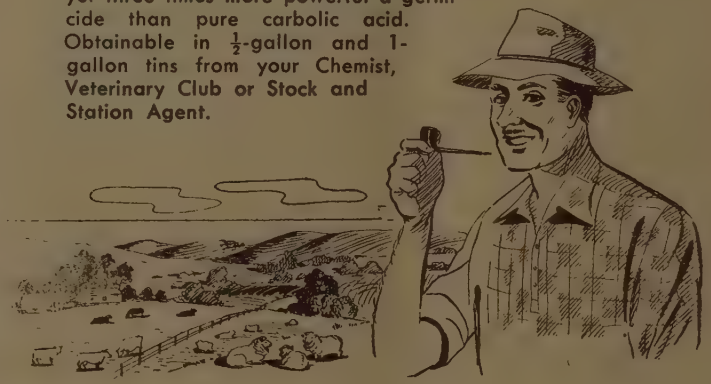

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*Trees on the Farm*

# Farm Forestry Associations

ASSOCIATIONS and societies exist for every conceivable pursuit or hobby, all with the aim of furthering the particular occupation that gave them birth. Some such bodies go further and seek to protect their members and others develop into co-operative societies. The same need abounds in respect to farm tree planting, and groups of farmers are considering the formation of local associations to further their interests. Here W. H. Jolliffe, Forestry Extension Officer, New Zealand Forest Service, Wellington, briefly discusses the functions and benefits of such associations.

A group discussing a point of interest during a field trip.

THE practice of forestry is comparatively new in New Zealand. The early pioneers brought with them trees with which they were familiar, and when they found these trees quicker growing than the indigenous species it was natural that they were favoured for forestry work. But ease of establishment and quickness of growth are only part of the story; there is much still to be learnt before the new species can be considered domesticated or even acclimatised.

## Current Work

WHERE it is intended to raise home-grown planting stock preparations should now be in hand. If the ground has not already been dug, it should be done as soon as possible. Where cone-bearing species are being sown it is best not to add lime.

The area necessary can be calculated as follows: If the trees are to be lifted as 1-year-olds, the density of sowing should be such that 1 sq. yd. of bed would yield 600 trees, but if they are to stay for 2 years in the bed, the same area should hold only 150 plants.

If the germinative capacity of the seed to be sown is not known, it should be tested immediately. The simplest method is to put a counted number of seeds on blotting paper in a shallow dish which is kept continuously damp (not too wet) and in a warm place. The number that have sprouted in about 4 weeks compared with the number put on test will give a guide to the density at which the seed should be sown.

## Information Service

The information being accumulated by such organisations as the New Zealand Forest Service and the afforestation companies is mostly restricted to a few species planted on large areas. Many of the problems of the smaller forest owner with his greater diversity of species will have to be solved by the farmer-forester himself with such aid as the larger organisations may be able to give. It is in this direction that farm forestry associations can make their first and foremost service; in the words of one such association, "to collect and disseminate information regarding forestry and forest products".

The main machinery of this "object of association" will of course be in the building up of a library of published information for lending to members. This service should be followed up or accompanied by the publication of a bulletin or newsletter to keep members informed of material in the library, of local experience, of dates of meetings, and doings at meetings, etc.

Meetings can be of various kinds: Lectures by some local or visiting authority on some aspect of the huge field of forestry and preferably supported by visual aids such as films, slides, or photographs; discussion groups in which discussion is opened by a short address by a leader on a subject; and field days on members' or nearby properties where there are woodlots which can serve as demonstrations. Also, since most of these activities would take place in country districts, their social value should not be overlooked.

## Co-operative Activities

Members of such an association may wish to go further and initiate co-operative activities in one or more of many ways. It may be in the raising of tree stocks for sale among members only; in the purchase and operation of community machinery such as power saws, small sawmills, or plants for the preservative treatment of non-durable timbers; in marketing standing timber or the produce therefrom; and, in large groups, perhaps in the employment of a forester full time or part time only. Participation in some of these activities of course necessitates the incorporation of the society or association and legal advice should then be obtained.

Quite apart from the numerous benefits to members of a live farm forestry association there is the broader objective of encouragement of others to plant trees where they will do good. So few landowners have apparently thought of woodlots as being of any use to themselves or to their properties that spreading the cult of trees can be classed as a real service to mankind.

Though associations of the kind described are news in many parts of New Zealand, there are at least two in existence and there is every likelihood of others forming in the near future. In many overseas countries they are a more common institution and range from a popular type of association through all degrees to the very business-like co-operative society. All share and help to solve the problems of the longest-term crop grown—trees.

# Steel-framed, Movable Glasshouse

DURING the past few years the design of glasshouses for commercial crops has been the subject of much study, particularly overseas. The emphasis has been placed on types which are strong and durable, will last for a long time, and allow the greatest amount of light to penetrate. Considerable thought has been given also to movable houses to increase production from one glasshouse during the year. In this article J. Coombe, Horticultural Instructor, Department of Agriculture, Christchurch, gives details of a steel-framed, movable glasshouse designed and constructed by Mr. F. Lucas, at Burwood, Christchurch.

MR. LUCAS designed this glasshouse with a view to being able to produce more than one crop a year and still to rotate the crops and have ample time for the soil to be weathered in the open between each two crops. Considerable thought was also given to the weaker parts of glasshouse construction, such as top and bottom plates, which frequently determine the life of a glasshouse. There is no doubt that when timber begins to rot in a glasshouse it is these points which go first, especially the bottom plate. In this structure these parts have been omitted.

The glasshouse is 93ft. long by 20ft. wide with side walls 7ft. high. The side walls consist of 1ft. of concrete foundation plus 6ft. of glass and have a slope inward of 1ft. from bottom to top. Steel has been used throughout for the frame and all joints have been welded, so that the frame is a rigid, complete unit capable of standing the strain without the use of inside posts.

The total weight of the finished glasshouse, without the concrete foundations, has been estimated at about 7 tons. Four men can push the complete structure lengthwise from one end of the foundation to the other after each crop. Alternating the glasshouse in one of two positions each year enables two crops to be produced annually from under the same house. The soil at the other end of the foundation meantime is being exposed to the weather for about 12 months. For

instance, a crop of freesias can be produced and when they are finished tomatoes can be grown in the same soil before the house is moved to the other end of the foundation, where a further two crops are taken before the house is moved back to its origianl position. Crops such as tomatoes, lettuce, freesias, and a number of winter flowers are suitable for this rotation.

## Foundations

One of the most important parts of the structure is the reinforced concrete foundation, as it must be accurate for the moving of the house and strong enough to stand the weight of the house and of any crop supported by the house.

Reinforcing of the foundation to make certain that it will not develop flaws appears essential. Three ⅜in. steel rods were used as reinforcing in Mr. Lucas's house.

Removing an end sash. One sash and one door have been removed.

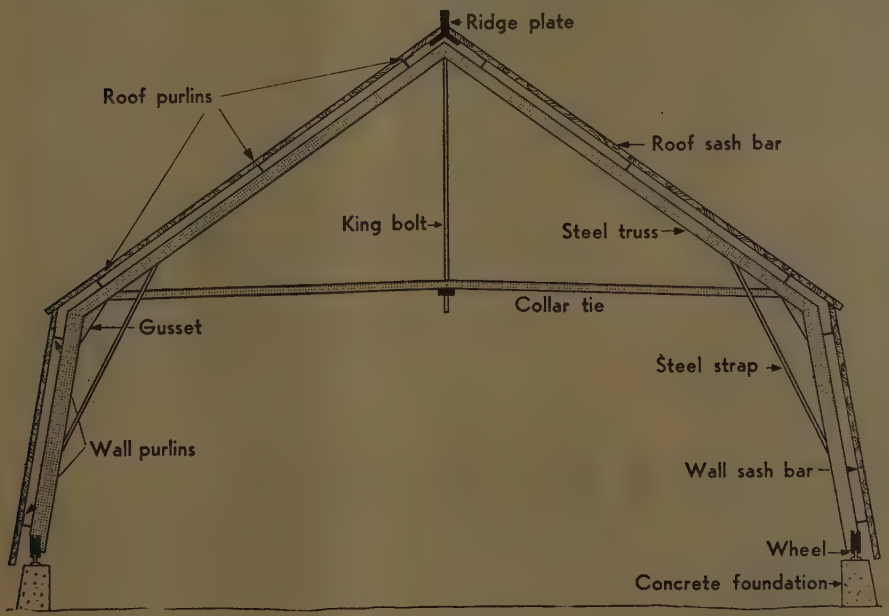
The foundation is double the length of the house (186ft. long by 20ft. wide) and projects 1ft. above the soil level, except at the ends of the house where the doors are fitted, where the foundation is level with the soil surface. The foundation is perpendicular on the inside of the house, but slopes outward on the outside with the top 6in. wide and the bottom 9in. wide at a depth of 16in.

A 3in. x 3in. x ¼in. steel T rail is bolted to the top of the concrete foundation to act as a rail track for the flanged 6in. wheels on which the house is moved. The bolts for this steel rail were embedded in the foundation when the concrete was poured.

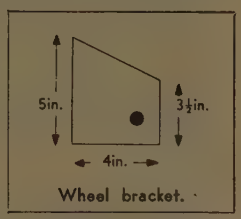
## Frame

The frame consists of 10 steel trusses, one at each end of the house and the other eight spaced at regular intervals (about 10ft. 3in. apart) along the house. The trusses are of 3in. x 1½in. x ¼in. channel iron and follow the shape of the glasshouse.

Two 5in. x 4in. x 3½in. brackets made from ⅜in. steel plate are welded to both feet of each truss; that is, one on each side of the house. The flanged wheels for moving the glasshouse are fitted into these brackets with ⅝in. bolts which act as axles. Spacers are used between both sides of the wheels and the brackets to ensure that no side movement occurs when the house is being moved.




Cross-section of glasshouse.




Wheel bracket.

Gussets have been welded into the trusses at the junction of the tops of the side walls and the lower edges of the roof to strengthen the trusses. These gussets are of ⅜in. steel plate 16in. long and 4in. wide at the widest point.

There is a collar tie made from 1½in. x 1½in. x ¼in. angle iron across

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each truss. The collar tie has a slight upward curve and is welded to each side of the truss just above the tops of the side walls. A king bolt reaches from the ridge to the centre of each collar tie. This bolt is made from $\frac{5}{8}$in. rod and has a long thread at the lower end to permit tightening to keep trusses under even tension and at correct width at the bottom.

To further strengthen the walls at the eaves a 1in. x $\frac{1}{4}$in. steel strap has also been welded into each truss. This strap reaches from about half way up the side wall to 2ft. up the roof from its lower edge.

## Purlins

The purlins, which extend the full length of the glasshouse and carry the sash bars, are of 2$\frac{1}{2}$in. x 2$\frac{1}{2}$in. x $\frac{1}{4}$in. angle iron. There are 10 of these members, three on each side of the roof and two on each side wall.

One purlin on the roof is 12in. down from the ridge plate, one is 10in. up from the lower edge of the roof, and the third one is half way between the ridge and the eave; they are about 4ft. 5in. apart. On the walls one purlin is 10in. from the bottom of the wall and one 8in. below the eave and they are thus 4ft. 6in. apart.

All points where the purlins cross the trusses are welded, which makes the steel frame very rigid.

Corner of glasshouse, showing slope of side wall, position of wheel and rail on the foundation, and wall overhang.

## Wind Braces

Cross-straps of 1$\frac{1}{4}$in. x $\frac{1}{4}$in. steel have been welded to both sides of the roof diagonally from the eaves to the ridge. On the end bays similar bracing has been welded to the side walls diagonally from the bottoms to the tops of the side walls.

Wheel at foot of a truss. The illustration shows how the glasshouse is anchored to the foundation.

## Treatment of Steel

All the metal work throughout the house has been treated with a rust preventive and then with red lead priming paint and a finishing coat of aluminium paint. The treatment of the metal work should hold for many years without further maintenance.

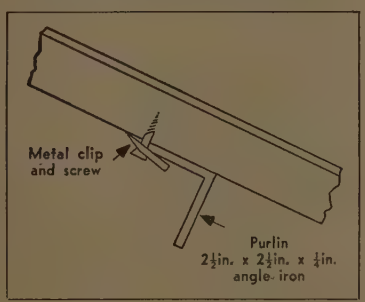
The woodwork (sash bars) will require the usual maintenance, but as much less timber has been used in the house than in the ordinary glasshouse frame, maintenance generally will be considerably reduced.

Portion of a truss inside the glasshouse, showing gusset, brace, top and bottom wall purlins, and wheel bracket and wheel. The gap between the bottom of the wall and the foundation can be seen.

## Sash Bars

All sash bars for both roof and sides are of 2in. x 2in. selected Oregon. Sash bars of these dimensions have ample strength for a house of this width when fitted with three purlins on each side of the roof. The placement of the purlins enables a sash bar to stand a man's weight at any point.

Roof and wall sash bars are held in position by small pieces of metal and screws. These metal clips are slightly curved and 2in. long, 1in. wide, and $\frac{1}{8}$in. thick. A hole large enough to take a screw is bored in the centre of each clip (see diagram below).



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| WELLINGTON: L. M. Silver & Co. Ltd., Jervois Quay - - - - - - - | 54-555 |
| CHRISTCHURCH: Wooff & Salvesen Ltd., 17-19 Lichfield Street - - - - | 60-449 |
| TIMARU: A. M. Duncan, 34 Latter Street | 1594 |
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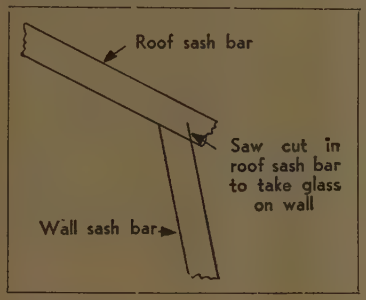
The metal clip is placed on the underside of the sash bar in such a position that one end of the clip overlaps the metal purlin and the curved end presses against the sash bar. It is then screwed securely into position. These clips are used to secure each roof sash bar at every purlin.

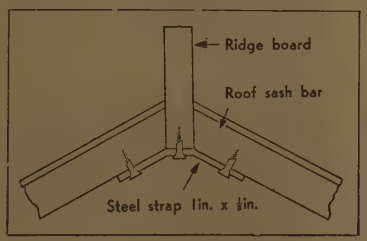
The wall sash bars are fastened to the top purlin on the wall by these clips and to the bottom purlin by screws direct through the purlin.

The roof and wall sash bars are jointed in such a manner at the eaves that no top plate is required (see diagram below).




## Ridge Plate

The ridge plate, of 6in. x 1½in. Oregon, is also held in position by metal straps and screws. The metal straps were cut from 1in. x ⅛in. steel and are shaped to fit the apex of the house. One strap is used at the junction of each sash bar and the ridge plate and is fastened by one screw into the ridge plate and one screw into each sash bar (see diagram below).




The use of screws instead of nails at all timber joints means that any wooden member of the glasshouse could be readily removed for replacement if the need arose.

## Ends of Glasshouse

The portion of the ends from the eaves to the ridge is built into the glasshouse, but the portion from the foundation to the eaves is removable to enable the glasshouse to be moved more easily.

An Oregon plate 4in. x 2½in. x 1½in. is fitted into the structure from side to side at the eaves.

Two doors each 3ft. 6in. wide which reach from ground level to the Oregon plate at the eaves are fitted into each end of the house. This gives an opening at each end of about 7ft. wide x 7ft. high and enables cultivation and other equipment to enter without difficulty.

The balance of the ends of the glasshouse is closed with large glass sashes and small asbestos cement sheets. Each glass sash is about 6ft. high by 6ft. 6in. wide and closes the end of the glasshouse between the door and the side of the house from the eave to the foundation. Owing to the sloping walls, asbestos cement sheets had to be used to cover the triangular portions not covered by the large sashes at the sides of the ends.

▲ Cross-bracing on side wall. This is used on end bays only.

▼ The finish at the eave on the outside.

## Wall Overhang

To enable the glasshouse to be moved a clearance had to be allowed between the glass at the bottom of the walls and the foundation; a gap of 2in. between the outside of the foundation and the glass was allowed. This gap is closed with a sheet of galvanised iron, which is taken out before the house is moved.

## Securing in Position

Metal brackets are used at each wheel to secure the house in position

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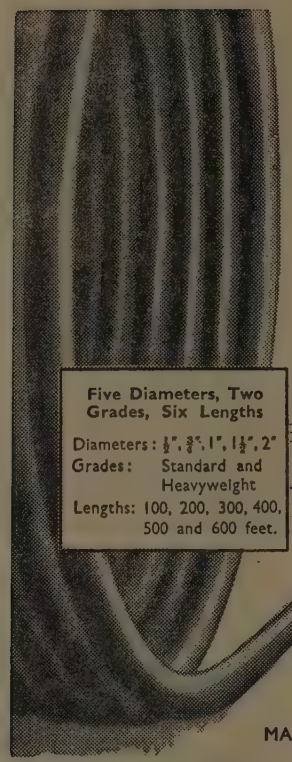

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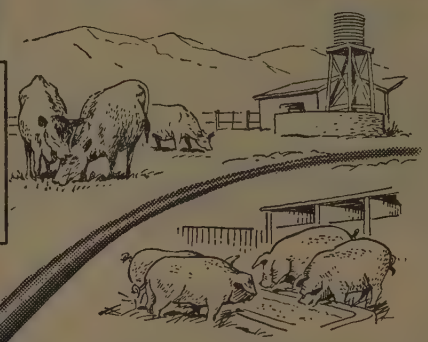

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during the growing of a crop. These brackets are cut from 1¼in. x 3/16in. angle iron and are bolted to the feet of each truss directly to the steel track on the foundation. Twenty of these brackets, one at the base of each truss on each side of the house, are used to make certain the house is held securely.

## Incidentals

The ventilators are of the usual type with wood sashes and glass. They are three panes wide and 20in. deep. Eight ventilators are used on each side of the ridge.

The size of the glass on the roof is 20in. square, and that on the walls is 20in. x 18in. The 18in.-deep glass on the walls was used to give a wall 6ft. high without having to cut glass.

The glasshouse is to be heated by ten 1in.-diameter hot water pipes placed in pairs one pipe above the other and 5ft. apart across the width of the house. These pipes will be suspended from the steel trusses and will move along with the house. The mains from the hot water system will be laid across the foundation in the centre of its length, that is, 93ft. from either end, and connected to the heating pipes by flexible couplings. The far ends of the heating pipes will be joined with couplings of a special type so that they can be fitted at either end when the house is shifted.

## Costs

The cost of this glasshouse is not known at present, but Mr. Lucas estimates that it cost him possibly £850. The cost would have been higher if the owner had not himself carried out most of the work except the glazing and welding, which was done by employed assistance.

The cost compares quite favourably with the present price for an ordinary standard wooden structure. The advantages of this glasshouse are its increased life and greater strength compared with those of glasshouses built of timber. Maintenance will be lower and more crops can be produced in a given period without harming the soil.

## House in Use

A heavy crop of tomatoes was produced in the 1955-56 season in the glasshouse, and it proved very efficient and of ample strength. It has also been moved from one end of the foundation to the other without the slightest difficulty or strain. The ease of moving was considered to be due to the accuracy of measurements and details worked out by the owner during its construction. Accurate measurements and solid foundations are of the utmost importance in erecting such a movable structure, as any strain may cause breaking of glass or other damage during moving.

It is considered that a fixed glasshouse built on similar lines to this one would be an improvement over glasshouses having top and bottom plates, as the cost would not be increased but its life would be greater.

**Acknowledgment**

The assistance given by Mr. Lucas in the preparation of this article is acknowledged.

# Pedigree Sow Records

**Contributed by the Animal Industry Division**

In the period January to June 1956 the following breeders had litters recorded as shown:—

| Owner's name and address | Herd book number | | Number of pigs | | Litter weight | | Litter grade* |
|---|---|---|---|---|---|---|---|
| | Sow | Sire | Born | Weaned | 3 weeks lb. | 8 weeks lb. | |
| **Wessex Saddleback** | | | | | | | |
| Clark, N. M. and F. S., R.D., Waimana | 1 | 3 | 8 | 8 | 116 | 407 | 2† |
| **Berkshire** | | | | | | | |
| Hunt, I. R., Oroua Downs, R.D., Foxton | 29597 | 28787 | 7 | 7 | 83 | 285 | 3 |
| McGregor, R. V., Kanakanaia | 29861 | 28662 | 9 | 9 | 107 | 372 | 2 |
| **Large White** | | | | | | | |
| Harrison, E. W., Hewitts Road, Fitzherbert West, Palmerston North | 11646 | 11290 | 14 | 9 | 106 | 384 | 2 |
| Harrison, E. W., Hewitts Road, Fitzherbert West, Palmerston North | 11666 | 11290 | 14 | 11 | 139 | 504 | 1 |
| Harrison, E. W., Hewitts Road, Fitzherbert West, Palmerston North | 12813 | 12824 | 14 | 10 | 111 | 432 | 2 |
| Harrison, E. W., Hewitts Road, Fitzherbert West, Palmerston North | 12620 | 12824 | 11 | 7 | 106 | 371 | 2 |
| Johnson, H. E., and Co., Stanton, No. 3 R.D., Whangarei | 12745 | 11492 | 13 | 12 | 123 | 452 | 1 |
| Harper, R. J., Broadlands, R.D., Reporoa | 11332 | 13223 | 14 | 12 | 106 | 364 | 2 |
| Harper, R. J., Broadlands, R.D., Reporoa | 12607 | 13223 | 11 | 10 | 96 | 240 | 4 |
| **Large Black** | | | | | | | |
| Thompson, R. H., Green Road, Kopane R.D., Palmerston North | 6364 | 6406 | 13 | 8 | 125 | 356 | 1 |
| Thompson, R. H., Green Road, Kopane R.D., Palmerston North | 6365 | 6400 | 10 | 8 | 138 | 372 | 1 |

**Minimum Litter Weight for Grades**

| Grade* | 3 weeks (lb.) | 8 weeks (lb.) |
|---|---|---|
| 1 | 120 | 360 |
| 2 | 100 | 300 |
| 3 | 90 | 270 |
| 4 | 80 | 240 |
| 5 | 70 | 210 |

**Breed Averages for the Period under Review**

| Breed | Number of litters recorded | Number of pigs | | Litter weights | | Average weight per pig | |
|---|---|---|---|---|---|---|---|
| | | Born | Weaned | 3 weeks lb. | 8 weeks lb. | 3 weeks lb. | 8 weeks lb. |
| Large White | 7 | 13.0 | 10.1 | 112.4 | 392.4 | 11.08 | 38.69 |
| Berkshire | 2 | 8.0 | 8.0 | 95.0 | 328.5 | 11.87 | 41.06 |
| Large Black | 2 | 11.5 | 8.0 | 131.5 | 364.0 | 16.43 | 45.50 |
| Wessex Saddleback | 1 | 8 | 8 | 116 | 407 | 14.50 | 50.87 |

* A No. 3 grade is classed as good, No. 2 as excellent, and No. 1 as special.
† This litter was recorded during 1955, but was inadvertently omitted from the previous review.

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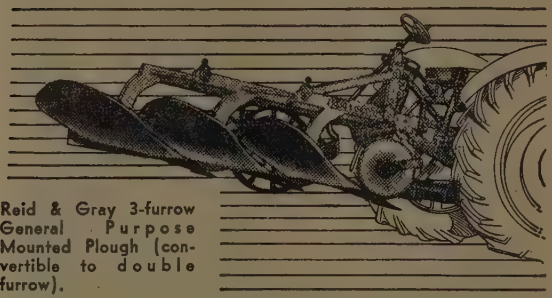

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# Treatment of Moss in Greens

By E. H. ARNOLD,
Assistant Fields Superintendent, Department of Agriculture, Auckland

**DURING winter moss will invade mismanaged playing turfs, those which are unnecessarily cut so closely that bare ground is exposed, those which are unthrifty and make little or no growth, those which weaken and open up in the bottom, and those which were damaged by bacterial and fungous diseases in late autumn or early winter, leaving bare ground or an open sward. Shade, even a light shading which tends to keep the turf unwholesomely damp, whether it be through overlong growth within the sward itself because of delayed cutting, or from trees, banks, walls, or buildings, encourages the establishment and spread of moss.**

THE primary principle for dealing with the moss problem should be prevention, not treatment. This requires those practices which give the sward every opportunity to produce a vigorous and dense, fine-leaved turf during the winter, off-play period.

## Fungicide Applications

Vigorous growth results when adequate nitrogen is applied. The sulphate of ammonia used in the standard 3 : 1 sulphate of ammonia and superphosphate mixture not only provides nitrogen but has a toxic and contact-kill action on the moss itself. However, it will not kill moss if it is washed off immediately by rains. Consequently it is best applied in the early morning with dew on the grass during settled, fine weather.

Many greenkeepers are opposed to applying this mixture under the conditions essential to giving good moss control because they fear that it will burn parts of the green when it is unevenly applied. This cannot be used as a sound argument against the practice and would suggest that it is more a matter of greater care being necessary when the fertiliser is spread. If fear of inefficient application prevents the treatment described, other preventive treatments must be considered.

In this connection dichlone and thiram (obtainable commercially as "Phygon XL" and "Thirospray") have been recommended. Though such treatments give excellent control of turf diseases such as brown-patch, red thread, and algal slime, their use on moss beyond the seedling stage has not been entirely satisfactory. Recommended rates are 1lb. of "Phygon XL" mixed thoroughly with 8 to 10 gallons of water and applied with a "hose ejector" to 180 sq. yds. of turf, or 1lb. in 100 gallons of water sprayed on the same area. If "Thirospray" is used, 2lb. per 180 sq. yds. will be required. The treatment should be applied after the autumn renovation and oversowing of bare, worn patches when the seedlings have grown at least ¼in.

If moss is not controlled by good management or by these materials, and the incipient infestation is not destroyed by the 3 : 1 sulphate of ammonia and superphosphate mixture, more drastic measures are required to "burn it out" without undue damage to the turf plants. A former standard treatment used quite effectively was dressings of sulphate of iron or ferrous ammonium sulphate. The latter replaced part of the sulphate of ammonia in the 3 : 1 mixture, the following proportions being used: 1 part of ferrous ammonium sulphate, 2 parts of sulphate of ammonia, and 1 part of superphosphate. These were applied at 1oz. per square yard to a dew-covered surface in settled weather. This treatment will clean up moss in a green, but if moss is present through poor thrift or over-acid conditions, more moss will reappear.

To eradicate the more advanced or well-established infestations of moss in greens without using sulphate of iron or ferrous ammonium sulphate, which can increase soil acidity and unthrift in the sward, the Greens Advisory Committee of the Auckland Bowling Centre in 1953 began trials with commercial preparations containing various forms of phenates. As a result sodium pentachlorophenate is now being used very successfully to eradicate moss either in the incipient or the well-established stages. Where incipient areas have to be dealt with ½oz. of sodium pentachlorophenate should be sprayed on 60 sq. yds. of turf (4lb. per acre), and for a similar area of old moss 1oz. (8lb. per acre) would be necessary. For the eradication of algal slime, and to prevent moss entry in winter, ½oz. of sodium pentachlorophenate should be sprayed on 50 sq. yds. of turf (2lb. per acre). At these strengths fine-leaved turf grasses will not be detrimentally affected.

Sodium pentachlorophenate is now obtainable commercially as "Weedone PCP". This material contains 2lb. of sodium pentachlorophenate per gallon.

When any of these treatments are applied the dead moss should be thoroughly raked off, seed sown in the bare or thin places, and adequate dressings of the 3 : 1 mixture of sulphate of ammonia and superphosphate given to stimulate the grasses and so restore thrift to the green.

However, where seeding is unavoidably delayed until spring the new turf plants are unlikely to stand up to hard play in the following summer. Consequently, unless the opening play for such areas can be delayed at least 2 months beyond the normal opening date, it would be wiser to depend on better management and adequate fertilisers to build up thrift rather than take drastic steps late in the year. Moss can be very troublesome, but good management, incorporating the methods of control described, can make spectacular changes in the position even over the short period of 1 year.

[*Photo News*

Control of moss in greens is best obtained by good green management.

# Renovating and Replanning Old Gardens

A NEGLECTED garden is a depressing sight and the first impulse when confronted with one is to make a clean sweep of everything and start again. This is not the best way to tackle the problem. A little delay for stocktaking and formulation of ideas about the future layout may mean that the garden will be re-established more quickly and more satisfactorily. In this article by J. S. Say, Horticulturist, Department of Agriculture, Auckland, hints are given on renovating and reconstructing old gardens. Notes on work for August are by Elspeth Gray, Horticultural Instructor, Department of Agriculture, Auckland.

TOO frequently new owners of established gardens hastily remove shrubs and cut down trees without giving a thought to their value. The fact that trees and shrubs are the greatest asset a garden can have is either ignored or is not realised. As a good garden cannot be made in a hurry, it is wise to take advantage of everything that will reduce the time required to develop one to maturity. Established trees and shrubs will do a great deal to help in this direction.

If the garden has been reasonably well planned and planted in the first place, it is safe to assume that everything was planted for a good purpose, though it may not be evident at first glance. Even where there has been no conscious regard to design or to the selection of material, some trees and shrubs may provide a very useful basis on which to work.

It is most important to assess the value of all plants on the property. Very often this can be done only by observing them through a full year. A shrub or tree which looks uninteresting in the middle of summer may colour up in autumn and burst into flower in spring. There may be unsuspected bulbs, lilies, or other dormant plants which could easily be thrown out or damaged if care is not taken. As a rule these are well worth keeping. Many gardeners regret the hasty removal of a tree in winter when they find there is not a cool, shady spot in the garden in summer. Regrets will not put back a hedge or shelter belt removed in summer when winds lash the garden in winter.

A full season may seem a long time to wait before any constructive work is undertaken, but the time need not be wasted. During this period the gardener can get to know his section and understand all its peculiarities. Many points about the soil, drainage, shelter, and other aspects can be found out only by experience and may have influenced apparently thoughtless original plantings. Ideas on how the garden can be developed will be formed gradually. Some of these will be discarded or modified for various reasons as time goes on and as a more intimate knowledge is obtained. It is a good idea to have a plan of the section and pencil in ideas.

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HEADING PHOTOGRAPH: Trees on a section are a great help in giving a new garden a mature appearance in a very short time. Effective use as a background and screen has been made of them in this garden. The mixed flower borders of shrubs, perennials, bulbs, and annuals are always bright with flowers, but the lawn has perhaps been too broken up by the planting of numerous shrubs on it. Sparrow photograph.

During this waiting period work will be more or less confined to maintenance. The paths, flower beds, and vegetable garden should be cleared up and kept free of weeds and rubbish, care being taken not to damage any dormant plants. Any planting should be confined to plants with a short life such as quick-growing annuals and vegetables which will be out of the way when the time comes for reconstruction. Trees and shrubs should be pruned at the appropriate times and the lawns and hedges kept cut. A great deal of dead or diseased wood can often be removed from the trees and shrubs regardless of the correct pruning time. Pests and diseases should be kept under control with suitable sprays.

As the various plants develop they should be watched and a note taken of their flowering time, colour, height, and spread. With fruit trees the variety and quality of the fruit should be noted. Anything that is obviously of no value for the particular garden can be removed. Good varieties which may be in poor condition through neglect are usually well worth keeping, for with a little extra attention they can be brought back to health. Bulbs, corms, and tubers (for example, narcissus, gladiolus, and dahlia) should be lifted and stored as soon as they are ready. Other plants should be labelled and the positions of plants which die right down should be carefully marked.

Those who intend to carry out alterations or make improvements to gardens which they have perhaps worked for a number of years would also be well advised to take careful note of their plants, for it is surprising how easy it is to forget the identity of varieties in the dormant season.

[*Sparrow*

With good planning and planting it is possible to make a garden on the most difficult section. This garden, for example, has been formed on a sloping, rocky section. If it had been levelled and put down in lawn, it would have been out of harmony with the surroundings. The rather severe lines of the house have been blended into the informal garden by the shrubs, which break the straight line at the base.

## Renovations

### Lawns

It should be possible after a month or two to decide if the lawn can be brought back into good condition or if it needs to be dug up and resown. It is very rarely that the latter course is necessary. With the use of hormone weedkillers and a good fertiliser programme a satisfactory, serviceable lawn can usually be formed in a comparatively short time unless a first-class turf of fine grasses is wanted.

Most flat weeds such as dandelions, plantains, and daisies can be killed during summer with a weedkiller based on 2,4-D. Applications of 3 parts of sulphate of ammonia and 1 part of superphosphate at 1oz. per square yard at 3-monthly intervals will encourage the grass, check the growth of weeds and clover, and inhibit earthworms by making the soil slightly acid. Many lawns which are

[*Sparrow*

An open sweep of lawn free of shrubs and flower beds makes a garden look larger.

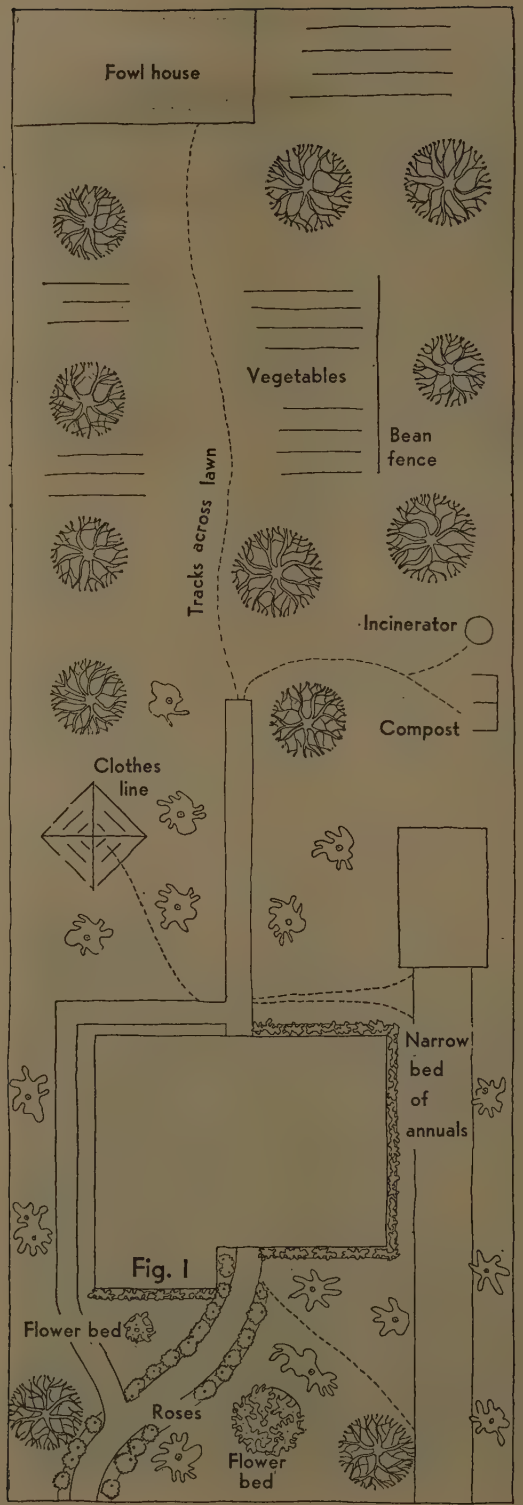

Fowl house
Vegetables
Bean fence
Tracks across lawn
Incinerator
Compost
Clothes line
Narrow bed of annuals
Flower bed
Roses
Flower bed

Fig. 1

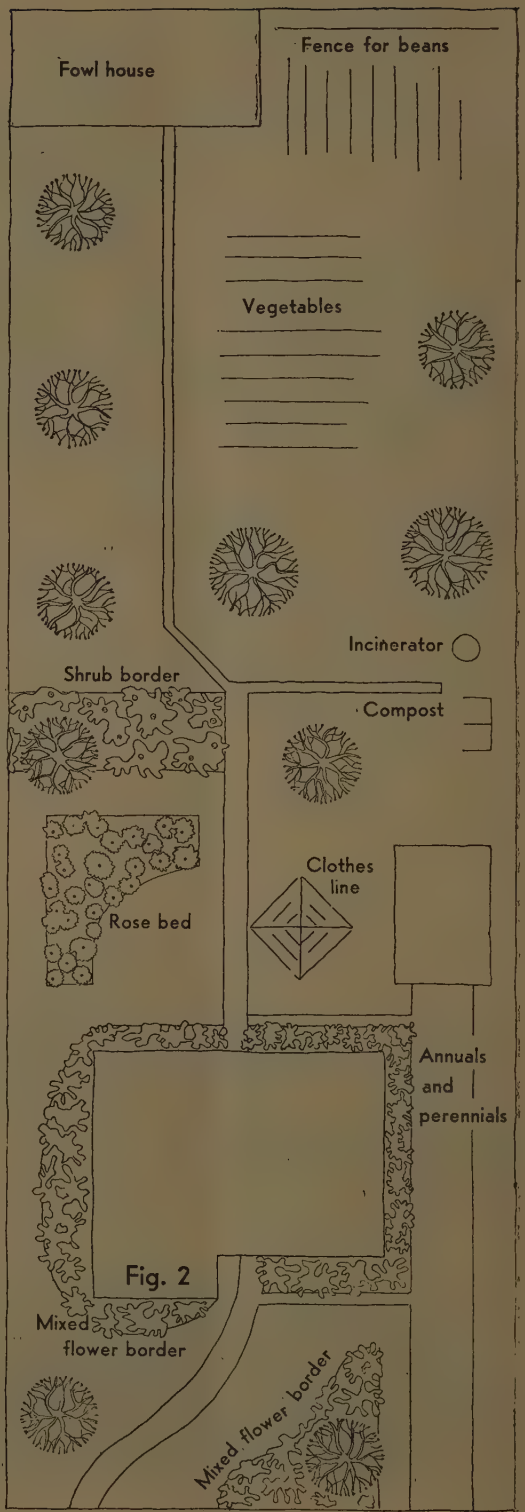

Fowl house
Fence for beans
Vegetables
Incinerator
Shrub border
Compost
Clothes line
Rose bed
Annuals and perennials
Mixed flower border
Mixed flower border

Fig. 2

soft and spongy in winter are not actually in need of drainage, for they will become firm as soon as a good sward, free of clover and worms, is established.

If the cover is sparse, the lawn can be oversown in late autumn or early spring. It should be given a good raking with a stiff rake, cut, and then raked again. Hollows should be filled and if possible some fine soil should be worked in through the grass over the whole area. The seed can then be sown.

Where the shape of the lawn is to be altered a great deal of time can be saved by lifting the turf and laying it again in the new position. The turf should be cut into pieces 1ft. square and 1½in. to 2in. thick. A special tool is made for this purpose, but the home gardener will find that a sharp spade will serve equally well. The area to be turfed should be dug over, raked, and tramped firm to the required level. After laying, the new turf should be tramped or beaten down with the back of a spade and some fine soil worked in with the back of a rake.

## Flower Borders

Late autumn or early spring is the best time for renovating flower borders. Until this time the beds should be kept weeded and a careful note made of such facts as the colour, height, and flowering time of all the plants.

For most satisfactory results all plants should be lifted so that the beds can be thoroughly prepared for replanting. It is also easier to get rid of twitch and other persistent weeds if this is done. The plants can be heeled in in another part of the garden to prevent them from drying out. Shrubs may have to be left in position together with any perennials such as peonies, which resent being moved.

The area should be deeply dug, compost or animal manure being incorporated if available. Before replanting, blood and bone at 4oz. to the square yard can be worked into the soil.

When replanting, clumps of perennials such as gypsophila which are not divided easily can be planted in one piece, but with perennial phlox, michaelmas daisies, and plants with a similar type of growth only the vigorous outside shoots should be used. The pieces should be planted about 1ft. apart in groups of 3 to 6, according to the space available.

## Shrub Borders

As with the flower borders no extensive renovating of shrub borders can be done until late autumn or early spring, when most shrubs can be shifted with safety.

During summer a certain amount of pruning can be done, and where the shrubs are very overcrowded some can be removed if they cannot be pruned to a reasonable size or if they cannot be used elsewhere.

Weeds should be kept down and a mulch of animal manure or compost with some blood and bone will be of assistance. Failing these a sawdust mulch can be used, but it should not be put on if the soil is dry. A liberal dressing of blood and bone should be applied before the sawdust.

(Lawns, mixed flower borders, and shrub borders will be dealt with fully in later articles.)

## Replanning

Where the garden has grown over a period of years without any system and has been neglected as well, it may be necessary to do considerable replanning. Garden planning has been discussed in two previous articles. The principles for planning a new garden apply when altering an old one. A plan showing all the existing paths, plants, and other features which are to remain should be drawn. The garden should then be planned around these, as much of the original material as possible being used, for it will be found that by using well-grown plants it will be possible to save 2 or 3 years in the time required to establish a well-furnished garden.

Many faults can usually be found in old, badly planned gardens. As a rule there are no dividing lines between the various parts; flowers, fruit, and vegetables being jumbled together and the lawns cluttered with flower beds and shrubs. Paths wander aimlessly and often serve no useful purpose. There is probably no path to the clothes line or to the garage.

Fig. 1 shows a house and garden layout with a number of faults typical of many small gardens.

The curves in the front paths do not serve any useful purpose and hinder access to the doors. The drive is more frequently used than the path as an entry, with a result that tracks have been worn across the lawns. There are no formed paths from the back door to the clothes line, garage, fowl house, incinerator, or compost heaps. Also, the clothes line is not in a handy position.

In the front garden roses in very narrow beds edging the path look out of place and accentuate the uselessness of the curves. They are also dangerous when in full growth. The lawn is cut up by trees, shrubs, and flower beds, which makes mowing awkward and adds a great deal to the time and work required for general maintenance. The foot-wide beds around the house are too narrow to grow anything but small annuals which are dwarfed by the mass of the walls and which tend to act as a dividing line between the house and garden rather than as a link.

In the back garden vegetables are grown in plots between the fruit trees. Because maintenance is difficult, weeds often take charge under and between the trees where vegetables are not grown.

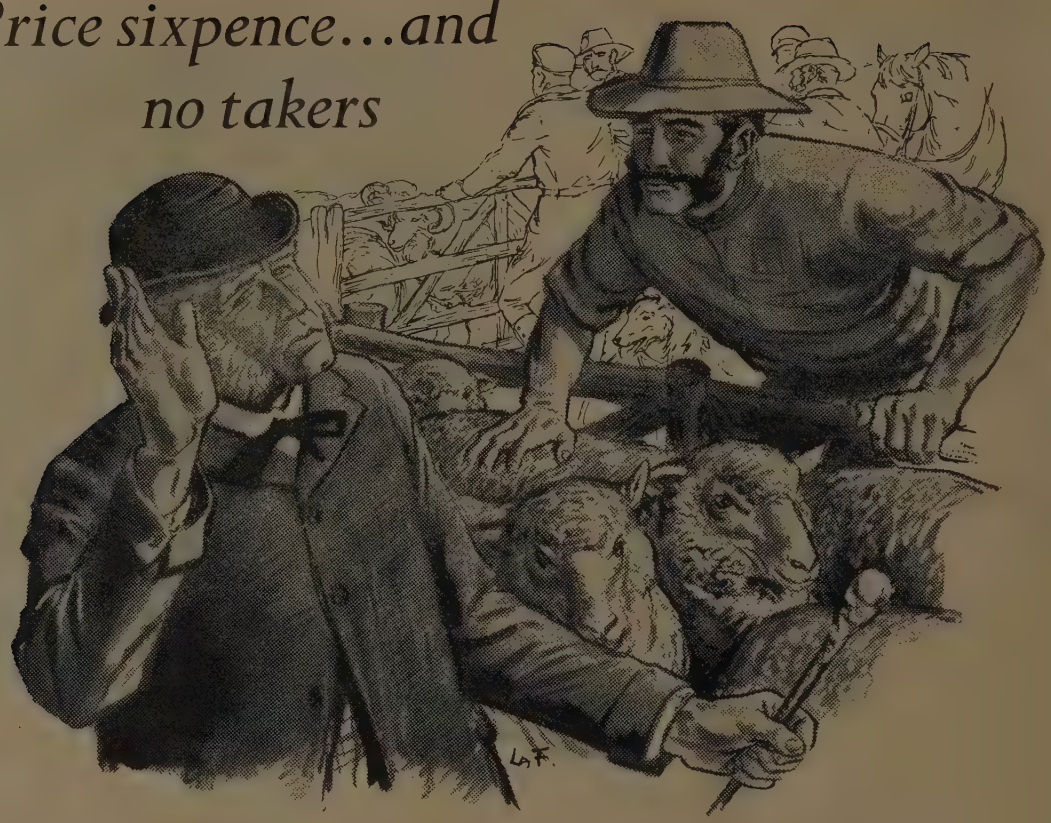
The garden as a whole is inconvenient and calls for a great deal of unnecessary work.

Fig. 2 shows how the garden could be made very much more convenient and workable with little trouble or expense. The layout is more orderly and gives an impression of added space.

[*Elliott*

**A pool in a sunny position always makes an interesting focal point in a garden.**

# *Price sixpence...and no takers*



In the 1870s, farming was in the doldrums and many a farmer could have been found trying to sell a sheep at sixpence a head. There was no market for New Zealand's enormous surplus stock.

In England, an exactly reverse situation existed. A fast-growing population had outstripped the country's home production resources and was crying out for food. And the shipping lines had a further problem; that of finding return freights for the ships which were bringing more and more migrants to New Zealand.

Not that there was any lack of produce in New Zealand. But England lay 100 days away—and what would become of meat and dairy produce after 14 weeks in an unrefrigerated hold?

It was quite obvious to the shipowners that the answer lay in solving the problem of refrigeration.

The experiments were many and varied. Then, on February 15, 1882, the Albion Line clipper "Dunedin" made New Zealand history. She sailed from Port Chalmers with 5,000 carcases of mutton as well as hares, rabbits, poultry and butter stored in a specially-designed freezing plant. She reached London in 98 days with the frozen cargo in excellent condition.

Four months later, the New Zealand Shipping Company clipper "Mataura" followed with 3,844 carcases of mutton, 24 quarters of beef and 77 pigs. She took 103 days on passage but again the cargo arrived in prime condition.

And there were no Freezing Works in those days where killing could take place. Slaughter had to be undertaken at the ship's side and the carcases frozen down on board. Nevertheless, the way was open.

The enterprise of the shipping companies had given to New Zealand a new and prosperous industry. And this enterprise is still working for the people who live and work here.

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The long path round the house has been removed and paths have been laid from the drive to the front and back doors. These give fairly direct access and remove the temptation to take short cuts across the lawn.

The shrubs which previously dotted the lawns have been brought together into beds and form the basis of mixed flower borders. With the judicious use of annuals, perennials, and bulbs among the shrubs beds such as these can provide interest and colour throughout most of the year. The wider beds around the house planted with a few shrubs and perennials have the effect of uniting the house and garden.

The curve of the front bed roughly agrees with that of the path which now does not appear so much out of place. The open sweep of lawn is easy to maintain and makes the house appear as if it were set further back from the road. The turf from the new beds has been used to fill in the old and the places from which the shrubs were removed.

The roses have been grouped into a bed at the back of the house. They will be more effective and will provide a better show than they did when lined up along the path. To form a background to the roses is a border of evergreen shrubs consisting of mainly winter and spring flowering species.

The clothes line has been shifted to a more convenient position and narrow concrete paths connect the fowl house and compost bins to the old path. Two fruit trees have been removed to give plenty of room for vegetables and the area under the remaining trees has been grassed down.

In the new plan practically all the existing shrubs have been used again. The only additional material required is for the shrub border behind the rose bed and a few perennials. The annuals which were previously used around the house and in the round beds will now be used in groups in the new beds.

## Flower Garden in September

September may be regarded as a month for the sowing of a large number and variety of flower seeds. Half-hardy annuals should still be sown in boxes and until the seedlings appear they should be covered with glass and brown paper to prevent the soil drying out. Immediately the first seedlings appear covers must be removed to give them light and air, but light shade may be necessary if the sunlight is fairly strong. As soon as they are large enough to handle seedlings from early sowings must be pricked out at about 2in. apart to avoid having weak, spindly plants.

### Bedding Plants

Hardier annuals may be sown outdoors in districts where the soil is workable. A good test as to whether the soil is right for sowing is to rake it over. If it does not break up to a fine tilth, sowing should be postponed until it is drier. It is better to make successional small sowings and keep up a constant supply of flowers than to have large numbers all coming on at once.

Seeds that may be sown outdoors now under suitable conditions include larkspur, clarkia, calendula, marigold, candytuft, and dianthus. The seed should be sown thinly to conserve seed and to avoid having to thin out too severely later.

Sweet peas are always in demand and a long display may be obtained by sowing the seed from early spring through to November. They may be sown outside in a warm, sunny, sheltered position or in small pots. Where the seed is sown in a permanent position the supports should be put in place at the same time not only to serve as a mark but also to avoid possibly damaging the young plants later. Where they are being grown on an existing fence or trellis this does not apply. Sweet peas should not be sown in boxes if that can be avoided because when they are transplanted there is more chance of the roots being damaged, and they will take longer to become established.

### Roses

All rose pruning should be finished this month and the bushes sprayed with bordeaux mixture or copper oxychloride as soon as pruning is completed. The beds can be lightly forked over, a mixture of blood and bone, superphosphate, and sulphate of potash put on in the proportions of 3 : 5 : 1 at 4oz. to the square yard, and a mulch of well-decayed farmyard manure or compost applied to keep down weed growth and conserve the moisture in the soil. The mulch should not be placed too close to the bases of the bushes, as it will retain too much moisture in that area and possibly cause damage to the plants.

### Hydrangeas

Where hydrangeas have not yet been pruned this can still be done in September. Strong new shoots which grew the previous season can be left or shortened back to plump buds. Growths that have flowered can be cut back to strong buds, the length left depending on how vigorous the wood is. Weak growths from the base of the plant should be removed, but hydrangeas should not be pruned too hard or they will then send up a great amount of new wood but very few flowers.

It is very disappointing when hydrangeas that have been bought for their clear colours, red, pink, or blue, gradually fade and even change colour. Colour is greatly influenced by soil conditions, with a strong

[*Sparrow*

**Sweet peas are always in demand and should be sown in a warm, sheltered position.**

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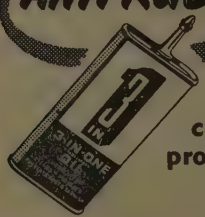

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tendency toward blue flowers on plants growing in acid soils and pink flowers on those growing in alkaline soils. It is possible to treat each bush separately to ensure that it will keep its colour. Pink or red ones are given lime at the rate of 4oz. per square yard, and blue ones can be improved by watering with a mixture of 3oz. of aluminium sulphate in 1 gallon of water at quantities up to 1 gallon per plant for large bushes. The soil round the roots must be moist before this solution is applied.

### Fuchsias

Fuchsias also may be pruned in September. Weak and spindly growths should be removed and long branches shortened back to form a neat, compact shrub. To encourage further branching the tips of young shoots can be pinched out when they have developed three or four pairs of leaves.

### Dahlias

Dahlia tubers which have been lifted and stored over winter will now be starting to shoot. The clumps may be divided by pulling them carefully apart, but care must be taken to see that each tuber has a healthy shoot on it. Cuttings can also be taken by removing the shoots as they become large enough and placing them in a box of river sand which should be covered, preferably by being put in a frame or glasshouse, until the cuttings have rooted.

### Lawns

Lawns that were sown in autumn may be given the first topdressing of fertiliser in September. The best general fertiliser for the home lawn is 3 parts of sulphate of ammonia and 1 part of superphosphate applied at 1oz. to the square yard. This should be repeated every 3 months both to encourage the good grasses and discourage weeds which dislike an acid soil. If the newly sown areas look yellow or unhealthy, they may be topdressed more frequently for the first 6 months.

### Gladiolus

September and October are the main months for planting gladiolus and successional plantings every fortnight should be carried on over these 2 months. A fertiliser of 3 parts of blood and bone, 2 of superphosphate, and 1 of sulphate of potash may be worked into the soil at the rate of 4oz. to the square yard well before planting time. Stakes should be put in when the corms are planted.

### Shrubs

Evergreen shrubs such as camellias and conifers may be planted during September. Frost-tender plants and sub-tropicals can also be set out in the districts where the climate is suitable, as the danger of damaging frosts is now over.

Evergreens do not become fully dormant during winter and moving them in the coldest months would have given them a greater shock than transplanting now. As the new growth is starting away, roots readily become established in their new position and the plant suffers very little check.

These shrubs are sold with a ball of soil round the roots and if this is dry when the plants arrive, they should be soaked in a bucket of water before the sacking or scrim is opened up. If they cannot be planted within a reasonably short time, they should be heeled in unopened and the ball completely covered with soil.

The hole in the permanent position should be dug large enough to take the roots easily and any fertiliser used must be thoroughly incorporated with the soil before planting. It is best to remove the sacking from round the roots, but if young roots have penetrated it, the top part only should be cut away. The disadvantage of leaving the sacking on is that any damaged or crooked roots cannot be seen and properly treated before planting. The method for planting is similar to that described for deciduous trees and shrubs in previous notes.

[*Sparrow*

**Wisteria should be pruned before the new growth begins, and the shoots that are kept should be tied firmly on to the support.**

### Climbing Plants

Climbing plants such as wisteria, virginia creeper, *Clematis jackmani*, and ornamental grape should be pruned before the new growth begins. Dead, tangled growth and thin, weak wood should be removed. The young, strong growths that are wanted should be tied to the framework and not twined through it. If the shoots are allowed to twine through the screen, pruning will be much more difficult and the trellis is likely to be damaged.

### Border Plants

A number of herbaceous perennials will now be starting into growth and if they have not been lifted and divided, some thinning out of the weaker shoots may be necessary. This will result in the remaining growths becoming stronger and the plants will also look tidier. Remove the weaker shoots as near to ground level as possible to prevent regrowth. Most perennials require staking and it is best to do this before they grow too big. By correct tying the ties can be nearly concealed as the plants grow. Large clumps will need more than one stake and it is easier to place them before the shoots have been blown over. After the border has been worked in the soil should always be hoed or lightly forked over.

# Wallpapers and Paperhanging

By ELIZABETH LAURENSON,
formerly Field Officer in Rural Sociology, Department of Agriculture, Auckland

IN this the second of two articles on wallpapers directions are given for trimming wallpaper, pasting and folding it, and for hanging it on walls and ceiling. Last month different kinds of papers and the preparation of wall surfaces before papering were discussed.

MATERIALS required for paperhanging are: A stripping knife, sponge, size, paste, paperhanger's brush, plumbline, paste brush, seam roller, 6ft. x 2ft. paste board with supporting trestles, and an apron with a large pocket.

## Amount of Paper Required

The number of rolls of wallpaper required to paper a room may depend on whether the paper is patterned or plain.

If the paper has a large pattern, there may be some wastage when the pattern is matched, whereas plain paper may be cut more economically. Any matching of the pattern should be allowed for when the amount of paper required is calculated. It is better to have too much paper than too little and find later that the paper is no longer in stock.

The following method can be used to find out how many rolls of paper will be needed to paper a room:—

Find by measurement the number of 21in. widths contained in the circumference of a room and divide this by the number of full lengths

obtainable from each roll. For example, measurement has shown that 30 widths are required in a room 7ft. 6in. high. From a roll of paper 11½yds. long four lengths of 7ft. 6in. can be cut plus waste. Thus:—

$$\text{Number of rolls required} = \frac{\text{Number of widths}}{\text{Number of lengths per roll}} = \frac{30}{4} = 7\tfrac{1}{2} = 8 \text{ rolls}$$

With patterned paper it may be necessary to cut lengths of 8ft.; therefore there will be useless short ends.

## Trimming the Paper

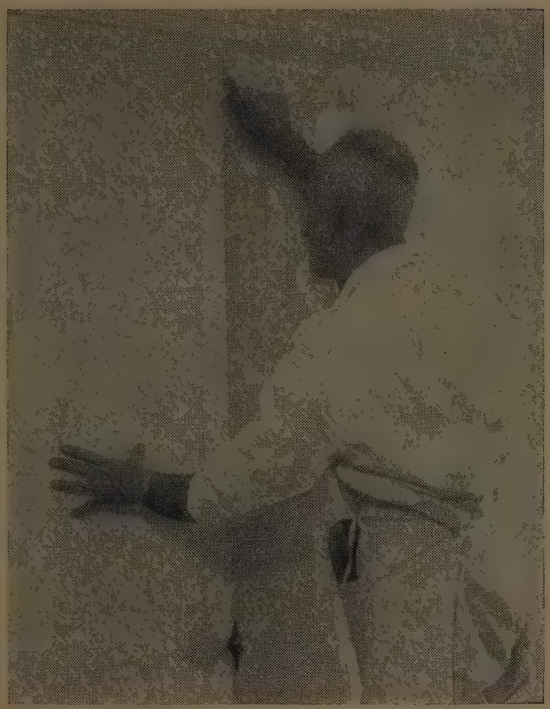
When wallpaper is bought there is usually ½in. of selvedge on either side of each roll which is not covered by the pattern and which must be trimmed away before the paper can be hung. This is the time to decide how the paper is to be hung and whether the joints are to be "lapped" or "butted".

Before any trimming is done the paperhanger should see whether any special marking or matching points appear on the selvedge. These may be marked lightly in pencil on the paper. He should also see that there is no variation in "shade" or "tone" between the rolls of paper.

In first-class work the joints are butted. This means that both selvedges are trimmed away and when the paper is hung the edge of one length of paper lies closely parallel to the edge of the adjoining sheet of paper. The edges must be trimmed very evenly so that there is no space between the two edges.

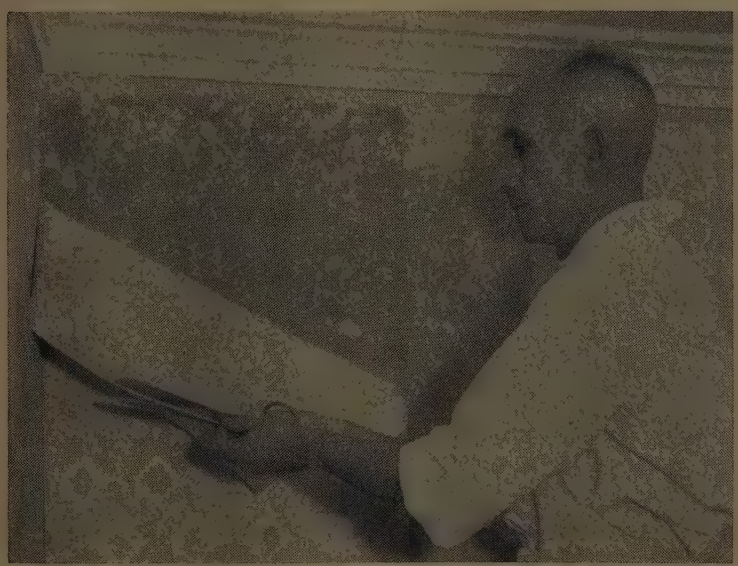
If the paper is to be lapped so that one side overlaps the adjoining side, only one edge is trimmed completely and the other edge may have the selvedge left or be trimmed to within ½in. The method of hanging when the joints are lapped is to work away from the light, that is, from the lightest side of the room toward the darkest side, so that the edge does not cast a shadow and the join is less obvious. Therefore, before paper is trimmed it must be decided whether the right or left edge is to be trimmed.

For example, hanging is begun on the right hand side of the main window and work is continued away from the light toward the opposite side of the room. Then hanging is begun from the left hand side of the window, again away from the light. The rolls of paper are trimmed accordingly.



[*Sparrow*

**Checking the hanging of the first length of paper with a plumbline. It is necessary to see that the first length is hung accurately and then succeeding lengths need not be checked.**



[*Sparrow*

**Trimming the top surplus of paper with scissors. The paper is then pressed back into position.**

Often the paper may be trimmed in the shop if required. Also special trimming gadgets may be used or scissors will do the job equally well. Some papers are semi-trimmed when bought and the selvedge can be removed readily. When paper is put on scrim the joints must be lapped, so semi-trimmed paper will not be suitable for use if it is patterned. Where both selvedges are removed the pattern will not match when the edge of one length of paper is lapped over the edge of the next length. If semi-trimmed paper is plain, matching is unimportant and the paper can be hung on scrim walls.

## Cutting the Lengths

The curl should be taken out of rolled wallpaper by sliding the paper, print side up, over the edge of a table and pressing the paper as it passes over the edge.

With plain or semi-plain papers, where no matching is required, each length is cut the measured height of the wall plus an extra 3in. or 4in.

A set pattern.

A drop pattern.

allowance for trimming at the ceiling and skirting.

With patterned papers the pattern repeat must be studied. Try not to spoil a pattern by cutting through it. Where possible have the complete pattern at the top where it is more noticeable than at the bottom. The necessary allowance for trimming should be left at the end of each length.

Patterned papers may have "set" or "drop" patterns. Those patterns which match at the same level at each edge of the roll are set patterns. The drop patterns match at a higher or lower level on opposite edges of the paper.

Cut the first piece the required length, making the necessary allowance for trimming and arranging a complete pattern at the top of the length. If the paper has a set pattern, other lengths are cut as exact replicas of the first length. With a drop pattern, where the matching point is at a different level, pass the next length along until the matching points coincide. It may be more economical to cut alternate lengths from two different rolls.

The cut lengths in the correct order for hanging are now turned face downward on the paste board, with the top end at the right of the bench, in readiness for pasting.

## Paste

Clean, fresh paste should be used at all times. Flour paste or starch paste can be made at home if desired.

**Flour paste** is satisfactory for ordinary demands. It has remarkable adhesive powers and is the most economical of all pastes.

**Recipe:** Mix 2½lb. of flour with cold water and beat to a smooth paste. Sprinkle a small teaspoon of washing soda over the surface. Stir and then add a gallon of boiling water, stirring all the time. A good, thick paste should result.

Put the paste aside to cool and when nearly set sprinkle ½ pint of cold water over the top to prevent a skin forming.

The paste is thinned as required with cold water. As paste decomposes rapidly, always use freshly made paste.

**Starch paste:** Starch is used sometimes instead of flour to make a first-class paste which has good adhesive qualities, smoothness, and elasticity. This paste is practically colourless and is used for papers which are delicate or papers with white grounds.

**Recipe:** Mix ½lb. of starch to a smooth paste with cold water. Add 1 gallon of boiling water, stirring all the time. The paste is used cold. When ready to use remove the skin, stir, and thin to the desired consistency with water.

There are also several paste powders available, some being mixed with boiling water and some with cold water. They have the advantage that most brands have a preservative against mould.

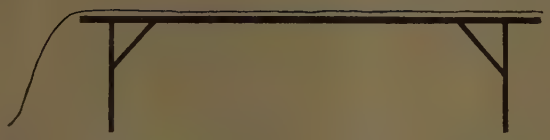
## Pasting and Folding

The lengths of cut paper are arranged on a trestle table or paste board 6ft. long by 2ft. wide, with the tops toward the right end of the paste board. Arrange the whole batch to project slightly beyond the back edge of the paste board. Each length is drawn forward as required so that the front and right hand edges are exactly flush with the front and right hand edges of the bench.

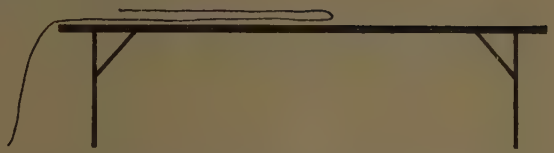
Paste must be applied evenly over the whole surface. Apply the paste down the centre of each length and then brush outward with herring-bone strokes from the middle to the edges. Never paste from the edge inward, as this may cause paste to be forced under the front edge. While the paperhanger is pasting the edge away from him he should hold the paper away from the surface of the next length by running the fingers of the left hand along it.

There is still a length of paper that must be pasted hanging down on the left of the table. Fold the pasted length to make room for the unpasted length by taking hold of the two corners at the pasted end, lifting the paper, and folding it at right angles toward the centre, pasted side to pasted side. See that the edges are square on both sides. Slide the paper

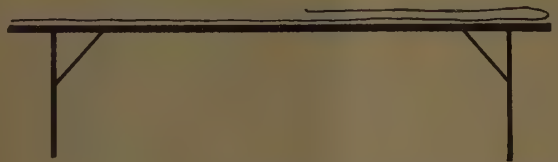
## Pasting and Folding Wallpaper



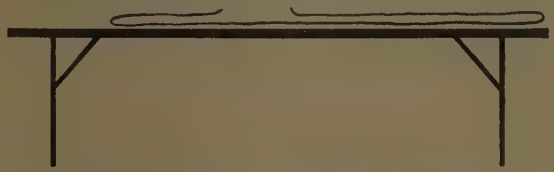
Paper on the table ready for pasting. The top of the length is at the right hand side of the table.



The first fold. This is always the longest fold so that the paperhanger can readily identify the top of the length of paper.



The paper is drawn to the right so that the unpasted portion lies on the table.



The paper is now pasted and folded ready for hanging.

toward the right to make room for the unpasted end. Paste and fold the remainder in the same manner.

The thickness of the paste used will vary according to the thickness and type of wallpaper. A thick paper needs a thicker paste. As well as "adhesion", "slide" is necessary so that adjustments can be made as soon as the material is put on the wall. Care should be taken not to thin the paste too much so that the paper becomes sodden and difficult to handle.

Cleanliness is essential. Keep a cloth handy and every time the paste board is clear wipe it down before using it again.

### Where to Start Hanging

If the paper has a bold pattern, it may be necessary to "centre" the pattern so that the pattern on one wall balances the pattern on the opposite wall. It will be necessary to plan the hanging of the paper so that the position of the central length is marked, and then from that the position of the other lengths can be measured on either side.

If the paper has a quiet, small pattern, hang from the lightest to the darkest corner of the room. Begin hanging on the right hand side of the main window and continue round to the opposite side of the room. Then hang from the left hand side of the window, continuing round to the opposite side.

The first length hung on each wall should be hung accurately to a plumb-line. Use a plumb bob to see whether the architrave is sufficiently accurate to serve as a guide for the first length. If the window is out of plumb, run the plumbline against the wall approximately 20in. from the woodwork. Apply the right edge of the paper to this line and work back toward the window.

### Hanging

Lay the folded paper over the left arm and mount the step ladder. Unfold the top of the length and press the pasted surface on to the wall along the top edge with the hands. Place the paper on the wall, taking care that the right hand edge is against the guide line. Carefully smooth down the centre with a brush; then brush toward the edges to right and to left. Now unfold the lower half, allowing it to hang down, and then brush it into position in the same manner.

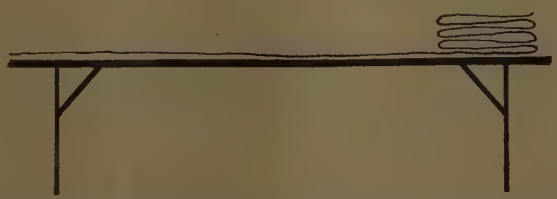
At the top mark the paper lightly by running the scissors against the picture rail or ceiling line. Pull the paper away from the wall, cut across the line with the scissors, and then replace the paper, smoothing it carefully. Repeat this trimming at the skirting board. When marking and trimming the top and bottom surpluses keep the pasted side away from the paintwork. Immediately after trimming run a damp sponge over the woodwork before allowing the paper to go back to the wall. Paste acts like caustic soda on new paint or varnish.

If wallpaper is hung on scrim, it is trimmed in a slightly different manner. A straight edge is used to press the paper into the angle of the wall and the ceiling. A knife is run along the straight edge to remove the surplus paper. This means that a small strip of paper extends on to the plaster of the ceiling. The same method of trimming, using a straight edge and a knife, is used at the skirting board.

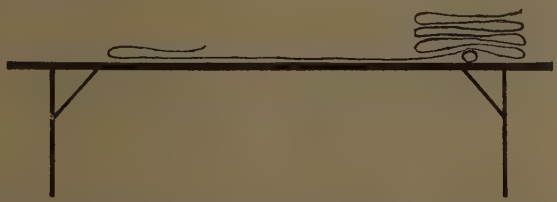
Never let cuttings flutter away. The pieces of trimmed paper should be doubled together so that they cannot stick to anything when dropped. Keep the floor as clear as possible.

Each succeeding length of paper is now hung in the same manner, care being taken to butt or lap the edges carefully so that the pattern matches perfectly. The quality of workman-

## Pasting and Folding Ceiling Paper



The paper is pasted and folded in a series of short folds. The paper is then drawn to the right of the table so that the unfolded portion lies on the table.



Another fold is made and the ceiling paper is now pasted and folded ready for hanging. The folded lengths are supported by a roll of paper.

ship in paperhanging is shown by neatness and accuracy of trimming and joining. After hanging three or four lengths of paper run a seam roller over the joints. Do not press too hard with the roller and do not roll the paper unnecessarily, as this produces a shine at the joints. Embossed papers should not be rolled at all but applied with a brush only.

Stouter-quality papers may need time to become pliable before being fixed into position. Sufficient time must be allowed for the paste to soak into the paper before it is hung. Soaking time varies with the thickness of the paper, a thick paper requiring a thicker paste and a longer soaking than a thin paper. The usual procedure is to paste one length and fold and set it aside to soak until the next length is pasted. By this time the first length is ready for hanging and the second length can soak.

**Corners**

When a corner is being turned the paper is cut at least ¼in. wider than the distance from the last length to the angle so that the paper can be pressed firmly into the corner and extend in a thin strip on to the next wall. The corner will then have a smooth, finished appearance. This is much more satisfactory than carrying the paper round the corner in one piece.

**Working around Obstructions**

Where possible the removal of obstructions such as electric light switches before papering is begun will produce a neater, cleaner finish. This is not always possible.

If an electric light switch is on the wall, proceed with hanging the length of paper in the ordinary way until the obstruction is reached. Now make a horizontal cut from the free edge of the paper across the centre of the switch and beyond. The remainder of the length is then brushed into position, but the outer edge and round the switch are not pressed down. Vertical and diagonal cuts are now made from the centre of the switch. Each ray of the star that is formed is then pressed into position, marked, pulled away, and cut with scissors and then the paper is pressed down again.

**Ceiling Paper**

When the ceiling is to be papered it must be done before the walls. The method of applying wallpaper to the ceiling is very similar to the method used for applying it to the walls. If the paper has a large pattern, the pattern must be centred and guide lines must be marked on the ceiling to mark the position of the first length of paper.

If the paper is fairly plain, hanging is begun on the window side of the room and the first length is hung parallel to the window. A chalk line is marked on the ceiling at a distance a little less than the width of the paper from the wall. This line is a guide for hanging the first length, and other lengths are hung in the usual manner, working away from the light.

The paper is cut and pasted and then folded from right to left in a series of short folds. The pasted and folded paper is then drawn to the right hand edge of the bench before the remainder is pasted and folded. The folded edges must be perfectly level; otherwise the paste will get on the patterned surface.

The folded lengths are supported by an extra roll of paper and held in the left hand. The paper is applied to the ceiling with the outer edge against the marked line and the paperhanging brush is used to smooth the paper on to the ceiling and into the joints between the wall and the ceiling. Work is carried out from right to left across the ceiling. The ends are then trimmed and each succeeding length is then hung, care being taken to butt or lap the edges.

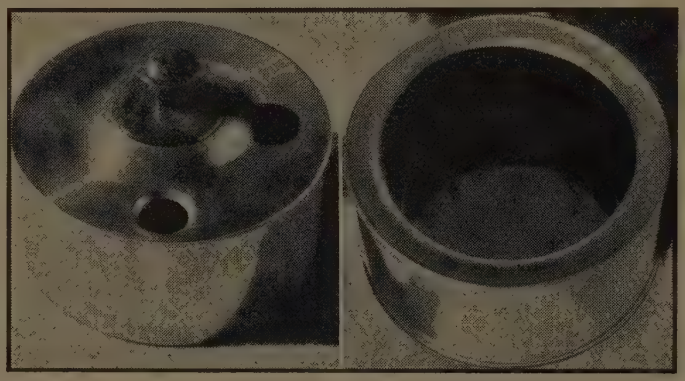
## Lining Papers

Lining papers, which are plain papers, may be used as a ground for distemper or paint or to improve a wall surface before a patterned or textured paper is applied. The paper is hung vertically with a lapped joint if the wall surface is to be painted. If the paper is used as a lining, the lengths are hung horizontally with butted joints.

## Borders

Various widths of borders are used to produce different decorative effects. Broader borders are called friezes. Some very interesting results are obtained by panelling. Two different wallpapers may be used on one wall, one as a margin and the other as a panel. The panel is often surrounded by a border and the panelling of one wall is considered and arranged in relation to the other walls in the room. Sometimes, by the use of panelling, it is possible to disguise the proportions of a room.

# An Efficient Butter Softener



THE simple device for softening butter illustrated above is a double-walled container which is hollow underneath and which is filled with very hot or boiling water and is placed over the butter, which should be on a flat plate. In 4 to 5 minutes the butter is soft right through. As the softener is made of aluminium, it will not rust. It has a plastic handle so that it can be picked up easily without burning the fingers, even when it is full of hot water.

For most efficient use of the device the butter should be placed on a flat plate, not a saucer or butter dish, as in such a dish the butter in the bottom will not soften. It is also a good idea to stand the slice of butter on edge, as it seems to soften more evenly. The great advantage of this device is that it softens the butter without melting it, and even if it is forgotten and left over the butter for ½ hour or so, the butter, though it may be a little oily on the surface, will not be completely melted, as invariably happens if it is put to soften in the oven or on top of a jug or bowl of hot water and is left too long.

The softener is available at hardware stores throughout New Zealand. It is well made, and though it is not cheap, the price is not out of proportion to that of other good-quality aluminium ware available.

*—EIRENE E. UNWIN, formerly Field Officer in Rural Sociology, Department of Agriculture, Christchurch*

# Home Freezers

[*Sparrow*

By EVELYN E. MOORE,

Field Officer in Rural Sociology, Department of Agriculture, Palmerston North

THE quick-frozen food industry is already firmly established in New Zealand, with a rapidly growing export trade. The home freezer, though less widely known, is coming to be regarded as a necessity by many housewives who own one. Others may be still debating whether its purchase will be of material advantage to them; others still may be considering whether to save toward the purchase of a freezer or refrigerator and wondering which will be of greatest immediate benefit to them. This article discusses some of the functions of a home freezer, the advantages of owning one, and finally, some of the important points which must be observed if foods are to be successfully frozen and maintained in good condition for eating.

THAT the refrigerator and home freezer, though they may seem akin, have really quite different uses is not always appreciated. The refrigerator is designed for safe, short-term storage of food such as milk, eggs, and butter at a temperature of about 38 to 40 degrees F. Units also have a small freezing compartment, though in some of the newer models this may take up 1½ cub. ft. to 2 cub. ft. or even more of the total space. This space can be used for making ice blocks or ice cream, for the temporary storage of commercially frozen foods, or even for freezing and storing temporarily cuts of meat and vegetables such as peas which cannot be used immediately. The temperature in these freezing compartments, though well below freezing point, is far too high for long-term storage of frozen foods, which should be stored at about 0 degrees F. (32 degrees below freezing point on the Fahrenheit thermometer) to keep satisfactorily.

Frozen foods should not be stored in a refrigerator for more than about 3 weeks and less than that if the weather is very hot and food cannot be kept really cold, that is, cold enough to keep ice cream really firm. Frozen beans and asparagus, which tend to deteriorate more quickly than other frozen foods, should be used within 12 days.

The home freezer, on the other hand, is designed to freeze foods quickly and store them safely at 0 degrees F. It cannot be used for day-to-day storage of such foods as milk, eggs, butter, and green vegetables, for which the refrigerator is ideal.

## Alternative to Bottling

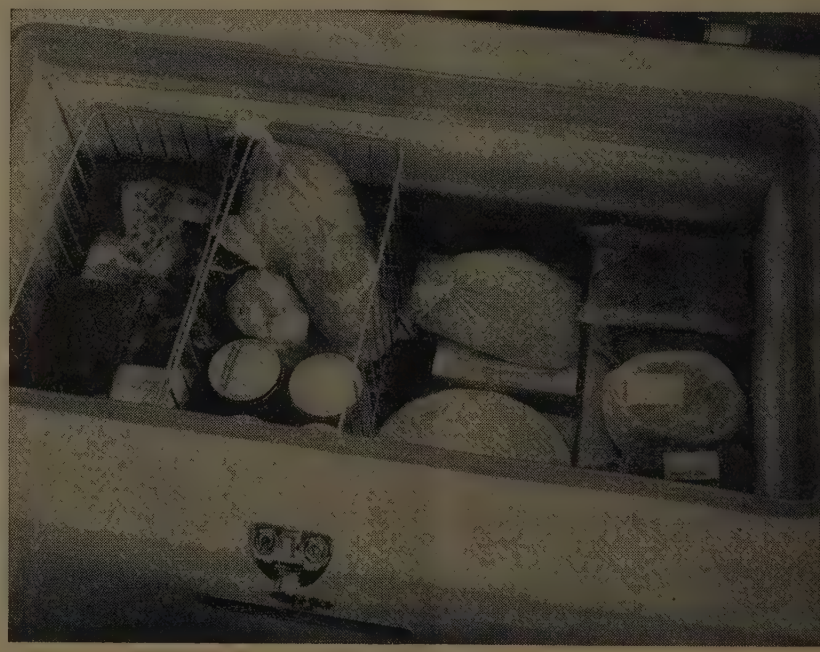
Much of the time spent in bottling fruits and vegetables can be saved and disappointments through improper sealing and sterilisation avoided if foods are frozen instead of bottled. The quality of frozen foods is usually higher than that of bottled products and frozen foods also usually have a higher nutritive value than bottled ones. A home freezer also enables a housewife to store and serve a much greater variety of foods throughout the year. Surplus vegetables and fruits such as peaches are easily frozen and retain their original fresh flavour, and game, trout, sea fish, lamb, and young poultry can be frozen for use in all seasons.

## HOME FREEZERS . . .

Though the freezer is valuable for long-term storage, it can, of course, be used for storing perishable foods for a much shorter time. Bread can be frozen and kept fresh for using over long weekends, or a weekly supply can be purchased, frozen, and sufficient taken out and thawed ready for each day's needs. Sandwiches, desserts, cakes, and other foods that perish easily or become stale can also be prepared ahead and frozen for using over busy periods. A further advantage on farms is that if the weather breaks and holds up work such as shearing and harvesting the extra food can be frozen and preserved in good condition until it is needed.

Of course the housewife must be prepared to spend time preparing, packing, and freezing foods the moment they are ready—just as in bottling and canning. It is also important to choose high-quality foods for freezing, as freezing does not make tough beans stringless or half-dried peas sweet and tender.

Preparation for freezing is also just as important as it is for bottling. The food must be properly packed and carefully sealed according to the directions given with the freezer if it is to maintain its high quality. The saving in time with freezing compared with other methods of preserving, though considerable, should not be overestimated. For example, a busy housewife who can never find time for jam making or fruit bottling may also be unable to spare the time required for preparing and packing foods for freezing.



Interior of a 9 cub. ft. home freezer → filled with a variety of foods, including meat, vegetables, fruit, and cakes, showing the use of different types of suitable packaging materials.

### Choice of a Home Freezer

The intending purchaser of a home freezer should first ask herself: "How big should it be?" Cost and available space must frequently affect the final choice, but thought must be given also to the size of the family, their likes and dislikes, the amount of surplus home-grown food likely to be available for freezing, and the use that is going to be made of the freezer for storing meats, baked foods, bread, game, trout, and other foods. A recent survey by a New Zealand firm showed that a third of their customers wished they had bought a larger freezer—a result substantiated by independent figures gathered from home freezer owners in America.

As a general guide about 2 cub. ft. to 3 cub. ft. of storage per person has been found to be sufficient for a family intending to freeze mainly surplus summer vegetables, a few packages of fruit, and perhaps some home-killed meat. If the freezer is to be used for storage of considerable quantities of vegetables, fruits, meat, game, fish, egg pulp, prepared soups, purees, bread, and baked goods, and little or no bottling is to be done, up to 6 cub. ft. of storage per person may be needed. This represents potential storage space for up to 180lb. of food per person, as 1 cub. ft. will hold about 30lb. to 35lb. of food. However, the weight per cubic foot of oddly shaped packages containing dressed poultry, bread, cakes, and similar foods is much less than this.

Other factors to consider in choosing a freezer include its appearance, the durability of the finish used, and the amount and type of insulation, which affects the economy of operation. Insulation should ensure at least 24 hours' safe storage in the event of power failure. The freezer should have a warning device to indicate whether the freezer is on or off (some makes have a warning bell, others a light) and a counterbalanced lid with an airtight rubber gasket seal.

A guaranteed supply of good packaging materials, wire baskets for easier sorting and packing of foods, adequate fast freezing facilities, a quiet, efficient motor, and a guarantee of fast, efficient service in the case of a breakdown are also important. Generally a well-known manufacturer is one of the best assurances of proper construction, insulation, and mechanical efficiency.

### Using the Home Freezer

In the siting of a home freezer a ventilation space of 2in. to 3in. all round must be left and a power point which does not need to be used for anything else should be handy. Since a freezer should not be opened more than once a day, it need not be in the kitchen. In fact, a cool, well-ventilated pantry or storeroom may be more suitable than the kitchen.

Owners of home freezers frequently find that it takes some time to learn to make really good use of them.

**Manufacturers assist by publishing instruction booklets and these should be read carefully and their recommendations followed implicitly if satisfactory service is to be obtained.**

A list of foods to be frozen must be drawn up first and a portion of the total storage space available allocated to each food. Otherwise there may be a temptation to freeze too much of one variety of food—of a bumper crop of peas or asparagus, for example—and then to find that no room is left for fruits or vegetables ready later.

Many who have changed from bottling to freezing still find it pays to bottle tomatoes and pears (which do not freeze very well), some stone fruits, and perhaps apples for winter use. A bottle of fruit can be opened in a couple of seconds and used for dessert when the unexpected guests arrive, but frozen fruits take 2 to 3

hours to thaw at room temperature. If some bottling is still done, more space is available for vegetables, meats, strawberries, raspberries, and other foods for which freezing is the ideal method of preservation.

In America, where home freezers have been in use for longer than here, many have found that, contrary to expectations, they did eventually tire of such choice vegetables as peas, asparagus, and sweet corn when quantities of these were available throughout the year. Thus, in making a preservation plan the family should consider whether they may not after all tire of some of the choice seasonal foods and therefore should aim at variety, freezing several different vegetables rather than a large quantity of one. The amount of work involved in preparation (in shelling peas, for example) should also be considered.

## Cost

Another important consideration for most home freezer owners will be the cost of home freezing. It has been found in America, where the economic aspects of using the freezer have been studied extensively, that if the costs of the freezer, electricity, wrapping materials, and other items are included, home-frozen foods cannot be produced particularly cheaply. Most people find factors other than cost, such as convenience, saving of time, and better year-round eating are more important.

Once purchased, however, a freezer can be operated more economically if the following factors are considered.

Generally it is more economical to freeze home-grown foods only. If foods are to be purchased for freezing, cost should be checked carefully against that of the commercially frozen article. Constant rotation of freezer loads (avoiding storing foods, especially non-seasonal ones like meat and bread, for long periods) and keeping the freezer full or nearly full all the time have also been found to be more economical than working to the pattern where the freezer is filled up in summer and becomes empty or nearly so by August or September.

It is also important to keep some sort of check on what is in the freezer, where it is stored, and how long it has been stored. Frozen foods all tend to deteriorate in time; some keep perfectly for up to a year and others may start to deteriorate in a week, so this time check is important.

Maximum use should also be made of the freezer to save the housewife time and energy in the kitchen. Double and triple the normal recipes for cakes, scones, and other dishes can be made, some for immediate use and the rest for freezing for use later. Much time spent in preparation is thus saved. Farmers may also find they save time by killing and dressing several sheep at one time—a carcass for immediate use and the rest to be frozen.

Sandwiches for school and farm lunches can be prepared at any convenient time and frozen, an aspect which may appeal particularly to the housewife who would like an extra few moments in bed in the morning.

← A group of suitable packaging materials, an iron for sealing, a roll of freezer tape (middle), and a pencil suitable for labelling packages.

## Preparing and Wrapping Foods

Most foods can be frozen satisfactorily, but a few cannot. These include bananas, salad vegetables such as lettuce, cucumber, and spring onions, custards, gelatine desserts and other jellied foods, desserts and sauces with a cornflour base, and shell eggs. Salad vegetables thaw out mushy and unattractive, though tomatoes and celery can be frozen if they are to be cooked before serving.

Preparation of foods is important, as few foods will retain their best flavour and appearance with simple packing and freezing. Browning and the development of off flavours sometimes described as "hay-like" will occur in fruits and vegetables, meats should be aged properly, and eggs should have salt or sugar added if they are not to become tough and "ropy".

### Vegetables

After thorough washing vegetables should be blanched in steam or boiling water to destroy the substances (enzymes) responsible for the development of off flavours. In the home, blanching in boiling water is usually recommended, as though a greater quantity of vitamins is dissolved in the water, the method is more easily controlled. For boiling-water blanching the following are required: A saucepan, preserving pan, or boiler which will hold a large quantity of water in proportion to the food being dipped (use about 1 gallon of boiling water to each pound of vegetables); a cheesecloth bag or wire basket to hold the vegetable to be dipped; plenty of ice water for quick cooling of blanched vegetables; and a fast-heating element.

It is important to have plenty of boiling water for blanching in proportion to the quantity of vegetables to be blanched, as otherwise the temperature drops too much when the vegetables are placed in the water and accurate timing is difficult. Thus, if the housewife has to wait 5 to 10 minutes for the water to boil again before she can time the blanching period, the vegetables may become too soft; if she counts the time from when the vegetables were put in the water, they may not be heated through properly and enzymes causing the development of off flavours may not be destroyed.

When the proper time is up (instruction booklets give this informa-

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tion) the food must be cooled as quickly as possible in ice water, as some vegetables especially become soft very quickly and the resultant frozen product is mushy and unattractive when thawed and cooked. Cold vegetables should not be left to soak in ice water, as they become soggy.

Better products result if the vegetables are prepared, blanched, and frozen as quickly as possible after picking. Sweet corn, which may lose 50 per cent. of its sweetness in a few hours after picking in hot weather, should always be blanched and frozen without delay.

**Fruits**

Factors such as promptness in handling and preparing fruits for freezing at the proper stage of maturity are as important as in the preparation of vegetables. Only high-quality, preferably tree-ripened, firm, ripe fruits should be frozen. Anything else can be disappointingly lacking in flavour when thawed and eaten. Special instructions for each fruit given in the instruction booklet should always be followed, as otherwise results may be poor.

Stone and pip fruits subject to browning are usually better when packed in syrup. Berry fruits, with the exception of strawberries, may be packed with dry sugar or syrup. Strawberries packed in dry sugar tend to collapse when thawed and should be frozen in syrup only. The addition of sugar or syrup helps to prevent browning as well as improving flavour. The quality of frozen stone fruits, particularly peaches, is enhanced and the tendency toward rapid browning on thawing is reduced if lemon juice is added (1 to 2 teaspoons per package). Ascorbic acid (vitamin C) is more effective than lemon juice, though it is more expensive; ½ to 1 level teaspoon of the acid is added to each quart of syrup used for packing the fruit. Ascorbic acid can usually be bought from a chemist.

The packer should also ensure that fruits are thoroughly covered with syrup. They may be held under by placing a piece of crinkled paper on top of the fruit before the jar or package is sealed.

**Meat and Fish**

Home-killed meat unless hung before freezing will be tough and unpalatable when cooked, like meat from a freshly killed animal. The period of hanging before the meat is ready for packing and freezing is that normally allowed before home-killed meat is cooked and varies with the weather.

Meat cuts should be made as compact as possible for packaging and excess fat should be trimmed off. They should be wiped clean with a damp cloth if necessary, but further preparation is unnecessary. Sea fish has proved rather more difficult to freeze.

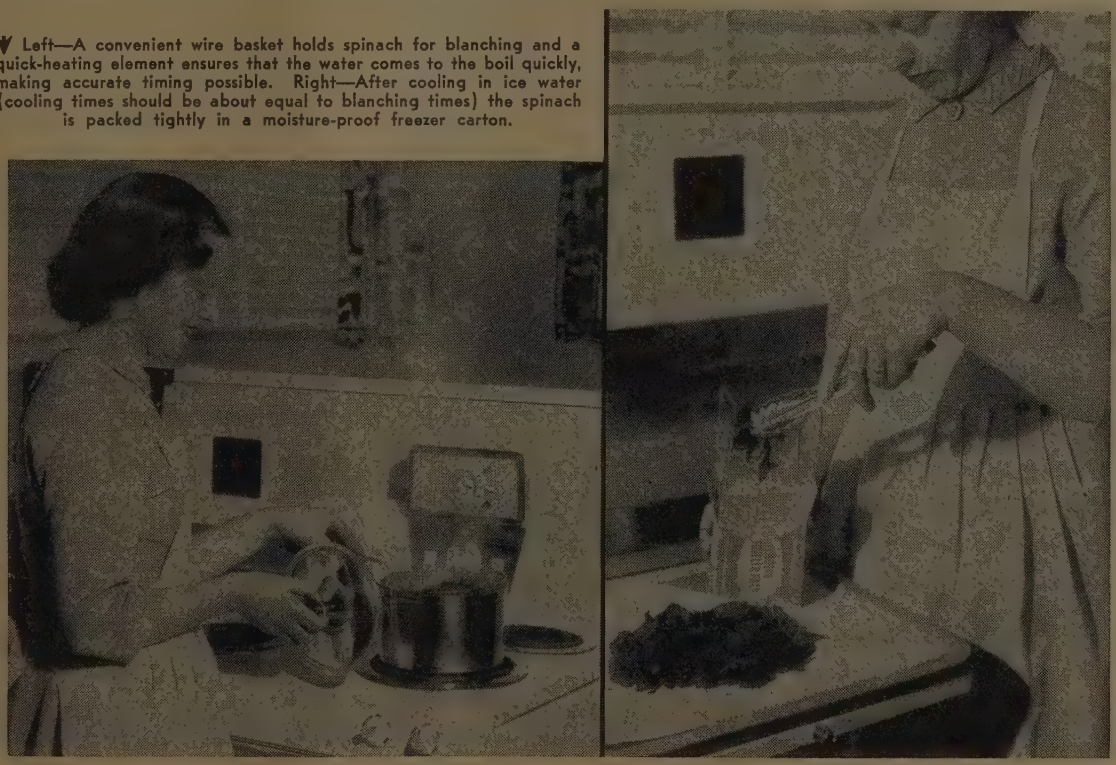
If it is to be kept for some time, it is improved by glazing before storing. The fish is frozen, dipped in ice water, refrozen to form an ice layer, and then wrapped in polyethylene and stored.

**Eggs**

As eggs can be frozen only as pulp, they are not perhaps as generally useful as preserved ones. Fresh eggs not suitable for preserving may, however, be shelled and frozen in cartons either as whole egg pulp or as separated whites and yolks. Yolks and whole eggs become tough and leathery on freezing unless they are broken and stirred up with salt or sugar (1 tablespoon of salt or 3 tablespoons of sugar to each pint of liquid).

A housewife should remember that she may have difficulty in using a large carton of eggs once they are thawed; small cartons containing not more than 6 eggs should be used if possible. Frozen egg white makes quite good meringues and pavlova cakes and is readily available when fresh eggs are expensive and preserved ones may have reached an age where they no longer separate easily without the yolks breaking.

▼ Left—A convenient wire basket holds spinach for blanching and a quick-heating element ensures that the water comes to the boil quickly, making accurate timing possible. Right—After cooling in ice water (cooling times should be about equal to blanching times) the spinach is packed tightly in a moisture-proof freezer carton.



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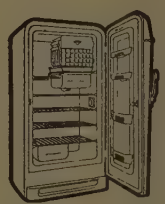

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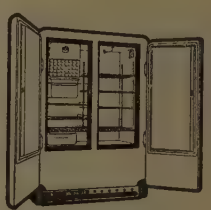

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**Ice Cream**

Home-made and commercial ice cream can both be stored satisfactorily in a freezer. Ice creams containing a small quantity of gelatine are said to keep their texture better than ordinary ice cream.

**Baked Foods**

Bread, cakes, pastry, etc., may be prepared and frozen either cooked or uncooked. Little is needed in the way of special preparation. It has been found, however, that with cakes results are better and there is less chance of failure if cakes are cooked before freezing.

Cakes should be put in the freezer as soon as they are cool. Bread should be frozen as soon as possible after purchase. Some users recommend the use of pure flavouring extracts in foods baked for freezing, as artificial ones may become bitter.

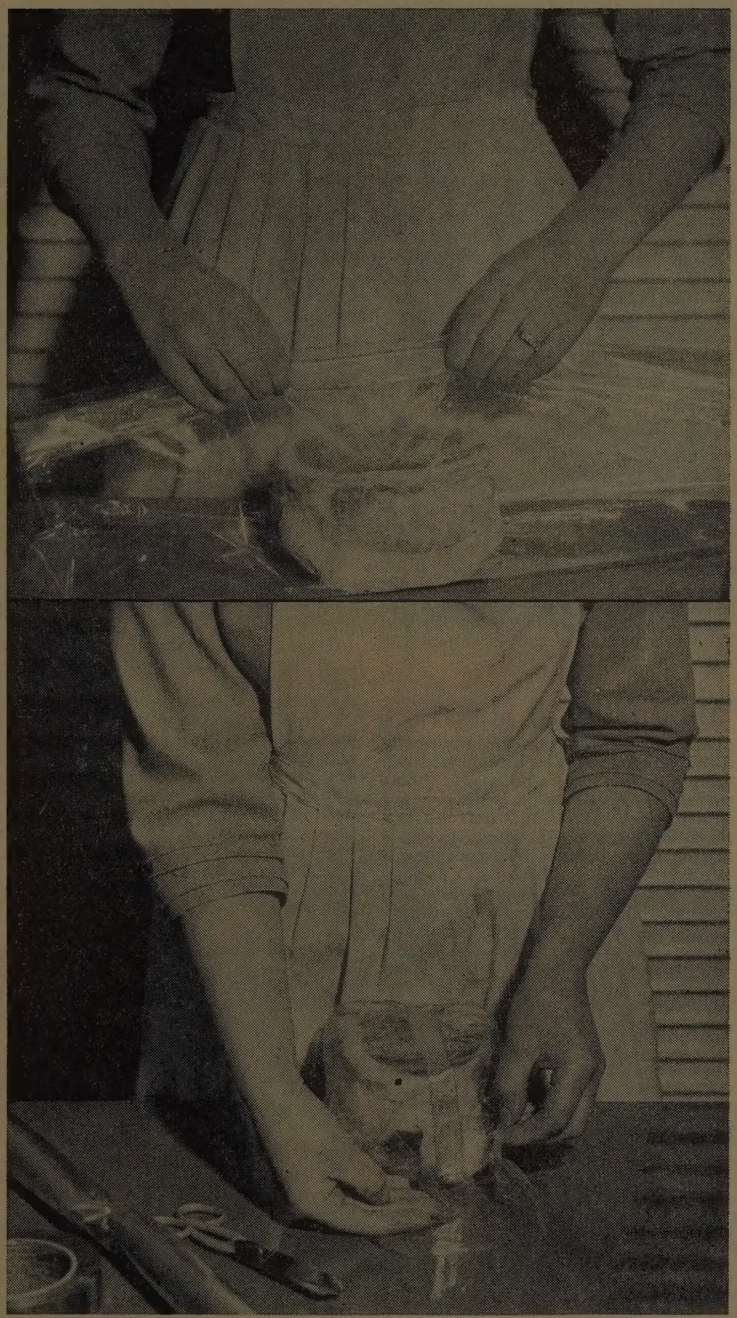
## Packaging Frozen Foods

If two important factors are borne in mind, the home freezer owner will be less tempted to use inadequate materials or improperly sealed packages. The first is that the freezer, like the refrigerator, provides excellent conditions for evaporation. The much lower temperature of the freezing coils in proportion to that elsewhere in the refrigerator or freezer results in moisture being continually deposited on the coils as frost, and more moisture evaporating from food present takes its place in the surrounding air. In a freezer this moisture evaporates from inadequately wrapped frozen foods, which tend to dry out and become tough and unappetising. On meats this is known as "freezer burn".

A second point, particularly important in relation to fruits and vegetables, is that frozen foods, especially poorly wrapped ones, do not maintain their good initial flavour indefinitely. Flavour goes off gradually and the flavour of poorly wrapped frozen foods stored for long periods may eventually be little better than, if as good as, that of bottled fruits and vegetables.

**Consequently every effort should be made to have packages as airtight as possible.**

Only recommended freezer wrapping materials and containers should be used. The housewife may find it pays to keep watch for the new wrapping materials, many of which are a great improvement on older types. Aluminium foil is especially useful for wrapping awkwardly shaped cuts of meat, as are transparent wrapping material and polyethylene bags. They should be filled with water to check for possible holes before use. They may be heat sealed, sealed with metal clips, or if not too full, by the ends of the bags being twisted and tied in a knot.



Packaging meat in transparent wrapping material. The ends are folded in several times to give an airtight seal (upper). The wrapping is folded smoothly over the meat to remove as much air as possible before the package is sealed with freezer tape (lower).

Stockinette and butter muslin may be used as protective wraps, as they help to prevent tears and punctures in the inner wrapping material. Transparent cellulose wrapping and waxed and grease-proof paper are not satisfactory.

The square or rectangular boxes supplied with freezers use a minimum of storage space and are easily stacked. Plastic boxes and tins with tightly fitting lids may be used if plenty of space is available, for baked goods, for example, though not for fruit unless they are specially lined.

In packaging as much air as possible must be removed, as otherwise air pockets between the food and wrapping material collect moisture from the food and may cause browning of some fruits, such as peaches. Meats should be wrapped tightly and smoothly and secured with string or freezer tape. Ordinary gummed tapes are too brittle and do not stick at freezer temperatures.

Informative labels are most important for efficient use of frozen foods. In addition to a plan of where each food is stored, there should be a label on each food showing the kind, weight, and date of storage. Details of any special treatment used in preparation should also be entered so that success or failure of the treatment can be noted.

## How to Freeze

Producers of quick-frozen foods usually lay emphasis on the superiority of the fast-freezing technique possible commercially but not in home freezers, few of which will produce temperatures of much below zero, compared with the 40 degrees below zero or more achieved in commercial packing plants. However, experimenters in the U.S.A. have found that while fast freezing is a factor in producing high-quality frozen foods, it is by no means the most important. This conclusion is borne out by many owners of home freezers who find they cannot tell the difference in flavour between their own and commercially frozen foods.

It is, of course, still important to freeze foods as quickly as possible, and the housewife should take advantage of the facilities available and use them to best advantage. Where special cold freezing plates or compartments are provided they should always be used. If they are not provided, foods can be packed so that there is available at one end a clear space the full depth of the freezer for freezing foods, as the bottom of a chest-type freezer is colder than the top.

Faster freezing is also achieved if food is made as cold as possible before it is put in the freezer. Packages should not be too large, as it takes too long for the centre of the packages to freeze, and the owner should not try to freeze too much food at once, especially in very hot weather.

Instruction booklets usually give recommendations about suitably sized packages for freezing and the amount that can be safely frozen at once, and the housewife should make a check before using her freezer. Large freezers, 14 cub. ft. and 25 cub. ft. models for example, have more powerful motors and are therefore capable of successfully freezing at one time much greater quantities of food than 6 cub. ft. models.

## Storage Periods for Frozen Foods

The greatest economy is obtained if the freezer is used for relatively short storage (6 months or less) than for storage times of up to a year. Thus the housewife who follows the routine common in ordinary household preserving (perhaps 1 to 2 months of intensive bottling, pickling, and jam making followed by a period when the stock is gradually used up) is not using her freezer storage space to best advantage. Running costs continue even if empty space is being kept cold, and if there is a serious power failure, a half empty freezer will warm up and possibly cause spoilage quicker than a full one.

Thus as peas, beans, and fruits are used they should be replaced by other foods such as tree tomatoes, bread, meat, and poultry, which is often at its best in late autumn. Foods can be ready baked and frozen for use in the busy times in spring and early summer, and other uses for empty freezer space may occur to the housewife as she becomes used to her freezer and what it will do. Some suggested maximum storage periods at 0 degrees F. are as follows:—

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|---|---|
| Fruits, vegetables, and eggs | Season to season |
| Fruit juices and purees | Up to 6 months |
| Mince | 1 to 3 months |
| Pork, fish | 3 to 6 months |
| Beef, lamb, mutton | 8 to 12 months |
| Poultry | Up to 9 months |

The storage life of most pre-cooked foods is shorter than that of uncooked foods. Suggested storage periods are:—

| | |
|---|---|
| Pies | 2 to 4 months |
| Baked breads and cakes | 4 to 6 months |
| Stews, etc. | 3 to 6 months |
| Batters and doughs | 1 to 3 months |
| Biscuit doughs | 6 to 8 months |

## Thawing and Using Frozen Foods

Most home freezer owners would probably agree that it takes time to learn to make the best use of home-frozen foods. Meal planning and preparation may need to be modified and cooking methods will need revision.

It is especially easy to underestimate thawing times for food or to find the flavour on cooking is poor. The best methods of cooking frozen foods or thawing them ready for eating have to be learnt. Several different methods of thawing (wrapped or unwrapped, in the oven, at room temperature, in the refrigerator, in cold, lukewarm, or hot water, or by placing straight in boiling water to cook) are available. The choice depends not only on the kind of food, but on how it is to be used. Quick thawing, as when unexpected guests arrive for dinner, may also be necessary.

By consulting her instruction booklet and by experiment the housewife should find the method for each food which best retains flavour and appearance.

Frozen vegetables are generally best cooked by placing the frozen vegetable straight into boiling salted water. Any temptation to use too much water should be avoided—about ½ cup for a 1lb. packet of frozen peas is sufficient. High heat should be used to bring the temperature back to boiling quickly, and the vegetables should then be cooked gently until they are done.

Fruits are best when thawed in an unopened container at room temperature and eaten while still slightly frozen.

### Meats

Frozen meats, with the exception of thin cuts such as chops and steak for grilling, generally should be thawed at room temperature, or in a refrigerator if there is time, before cooking, as the cooking time is otherwise difficult to determine. If thawing has to be speeded up (large roasts may otherwise take 10 to 12 hours to thaw at room temperature), the meat may be placed (still wrapped) in lukewarm or even hot water, but the method is not generally recommended.

Frozen pies are usually thawed in the oven, as this prevents the crust from becoming soggy. Cakes (uniced) and bread may be thawed either at room temperature or in an oven. Sandwiches should be thawed at room temperature.

Actual thawing times depend on the sizes of the packages, but 2 to 3 hours per pound of food is usually adequate for most foods. However, big piles of sandwiches (prepared well beforehand for a dance or party) may take 5 to 6 hours to thaw.

If New Zealand housewives are at all like their American counterparts, who according to statistics published in 1954 were buying freezers at 1,200,000 per year, the home freezer is here to stay. Eventually it may come to be regarded as great a necessity in many homes as is the refrigerator today.

## Books on Home Freezers

Books with useful information on home freezers include "Home Freezers", by G. J. Stout (Van Nostrand (New York) and Macmillan (London), 35s.) and "Into the Freezer and Out", by O. K. Tressler, C. F. Evers, and B. H. Evers (Avi Publishing Company, New York).

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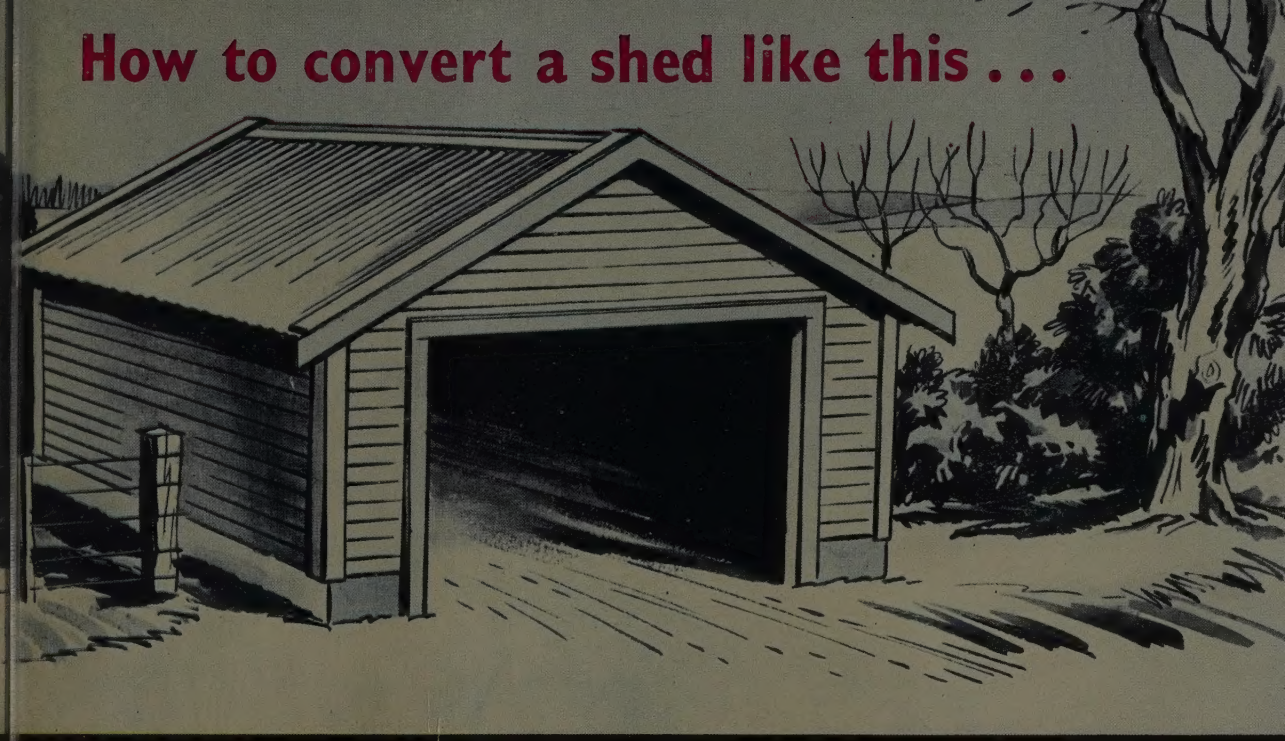

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